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Hayes et al.

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(45) **Date of Patent: Mar. 29, 2016**

(54) **ELECTRIC CABLE SWIVEL AND RELATED FABRICATION METHODS**

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US 2015/0200512 A1 Jul. 16, 2015

(51) **Int. Cl.**
H01R 39/00 (2006.01)
H01R 39/64 (2006.01)
(Continued)

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CPC ***H01R 39/64*** (2013.01); ***H01R 13/504*** (2013.01); ***H01R 13/523*** (2013.01); ***H01R 13/565*** (2013.01); ***H01R 43/005*** (2013.01); ***H01R 43/18*** (2013.01); *Y10T 29/49199* (2015.01)

(58) **Field of Classification Search**
CPC H01R 4/60
USPC 439/184, 201, 271, 521, 675, 20, 589, 439/587, 11, 13; 385/56
See application file for complete search history.

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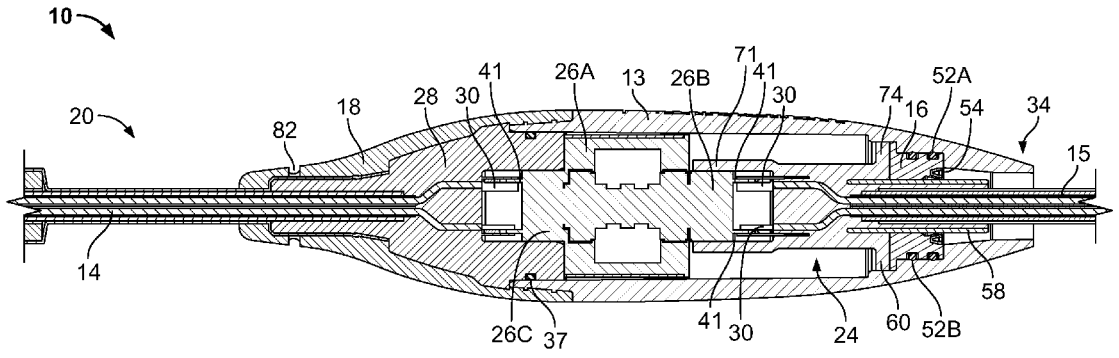
Primary Examiner — Abdullah Riyami
Assistant Examiner — Nelson R Burgos-Guntin
(74) *Attorney, Agent, or Firm* — McCarter & English, LLP

(57) **ABSTRACT**

Improved electric cable swivel assemblies and related fabrication methods are provided. More particularly, the present disclosure provides improved electric cable swivel assemblies configured to reduce entanglement of swimming pool cleaner power cables, and related cable swivel fabrication methods. In exemplary embodiments, the present disclosure provides for a electric cable swivel assembly including a swivel body/housing that is configured and dimensioned to mount with respect to a first cable and a second cable. The swivel body/housing is configured to provide a continuous electrical contact between the first and second cables, wherein the first and second cables are generally axially rotatable relative to each other. Methods of overmolding and/or otherwise fabricating the swivel are disclosed herein.

23 Claims, 19 Drawing Sheets



(51) **Int. Cl.**

H01R 43/00	(2006.01)
H01R 13/504	(2006.01)
H01R 13/523	(2006.01)
H01R 13/56	(2006.01)
H01R 43/18	(2006.01)

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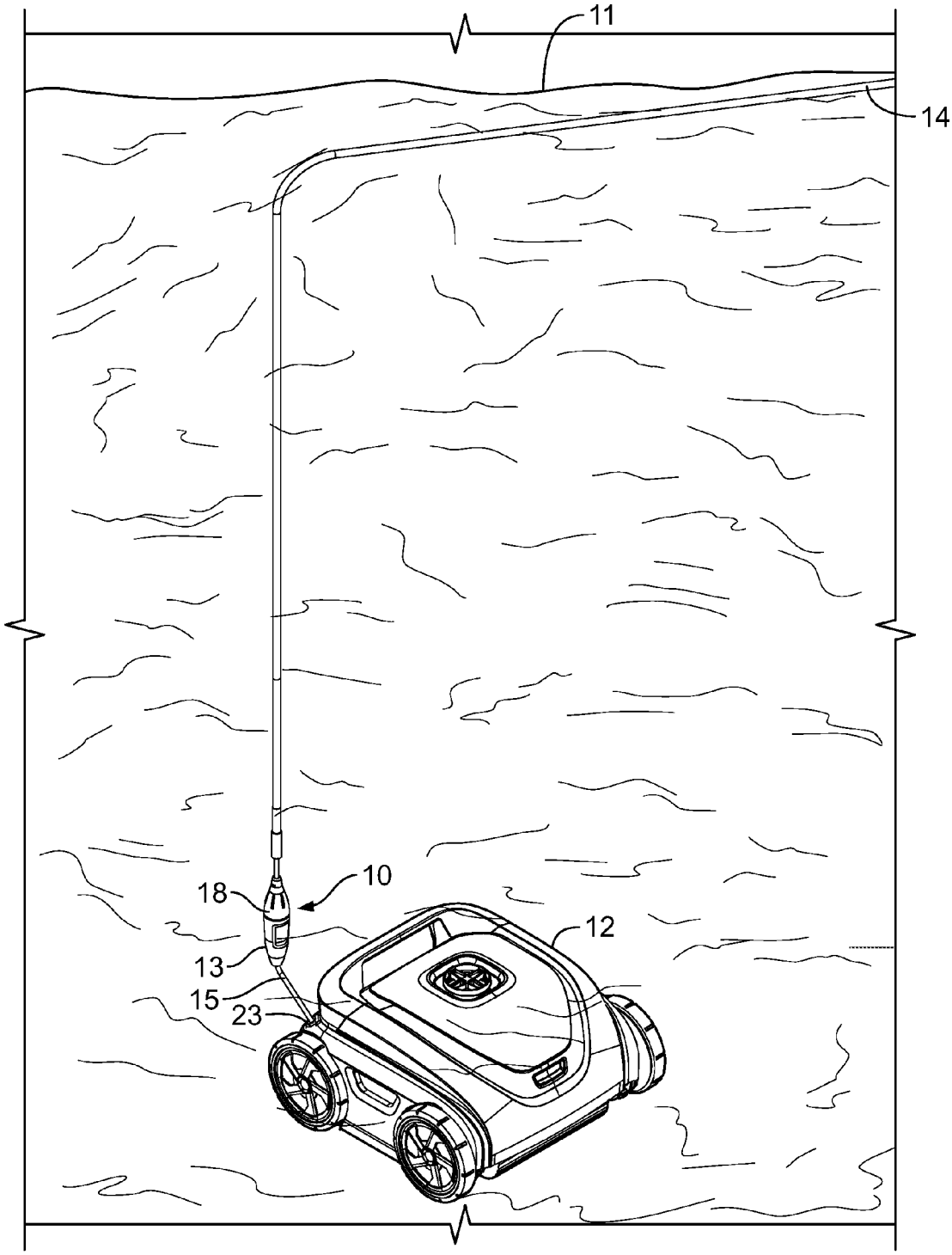

FIG. 1

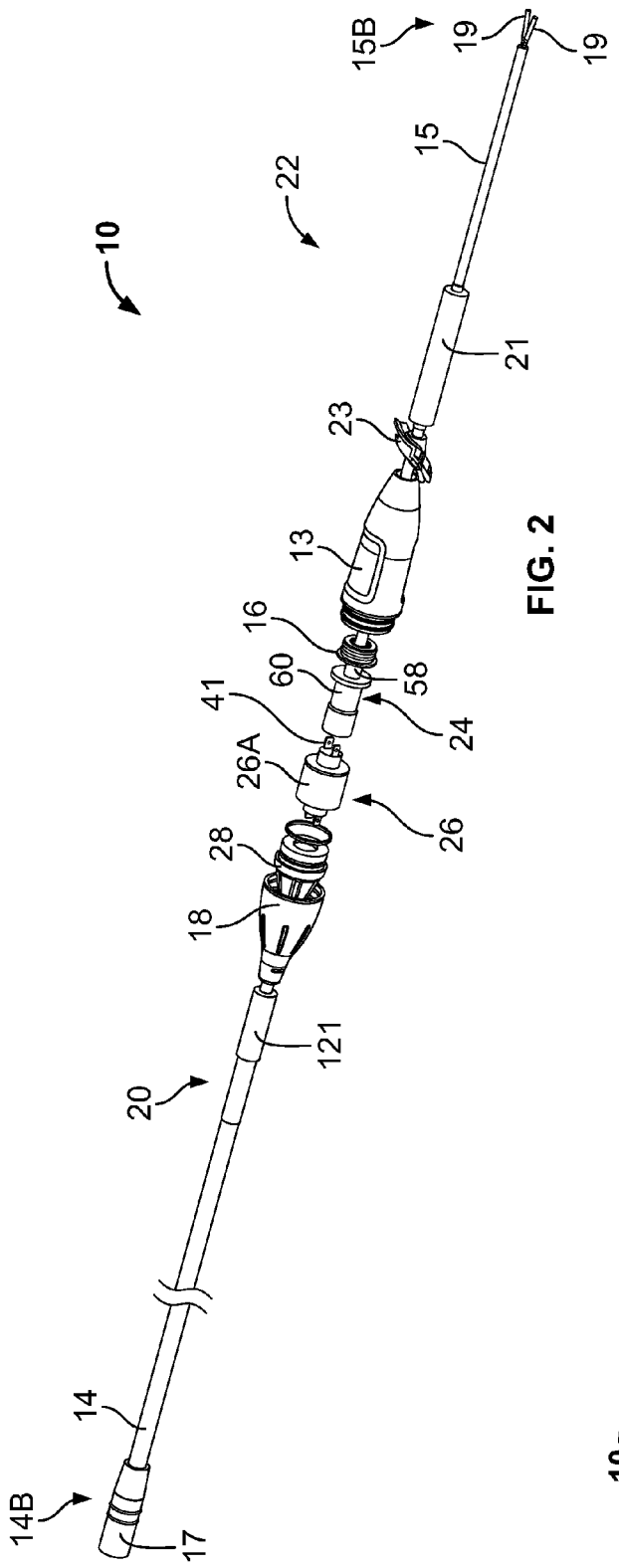
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FIG. 2

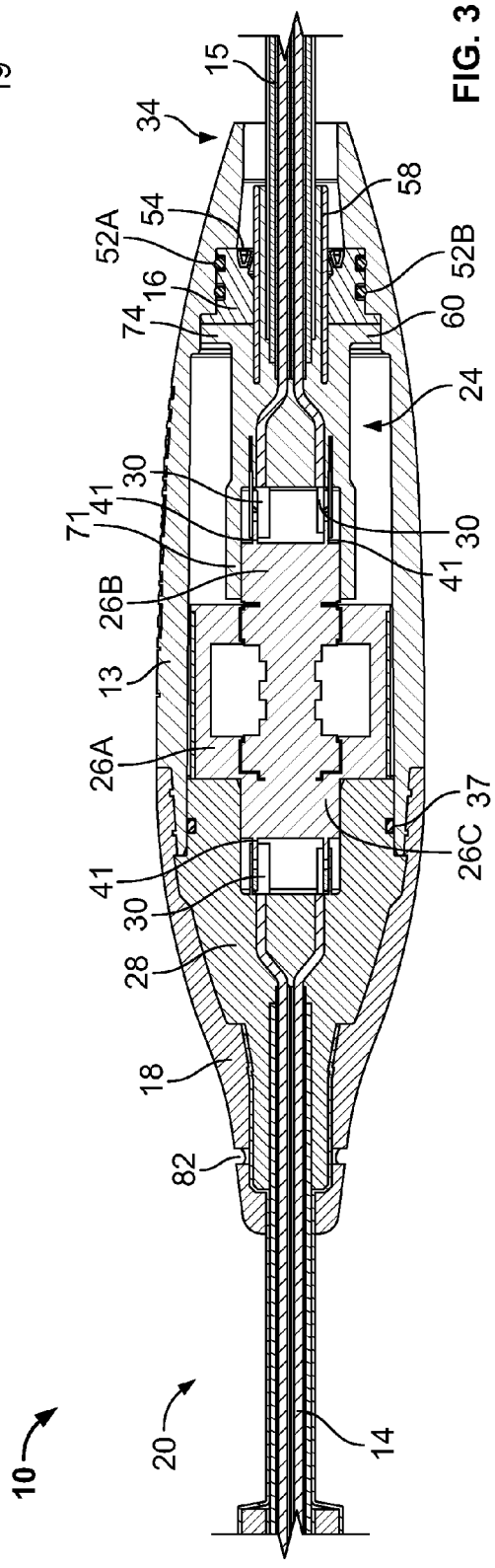
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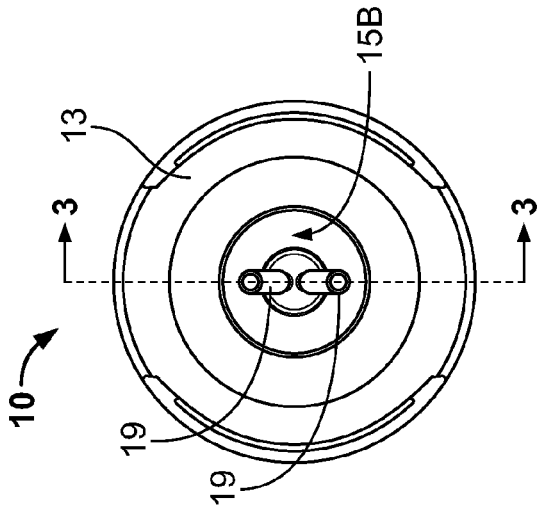
FIG. 3



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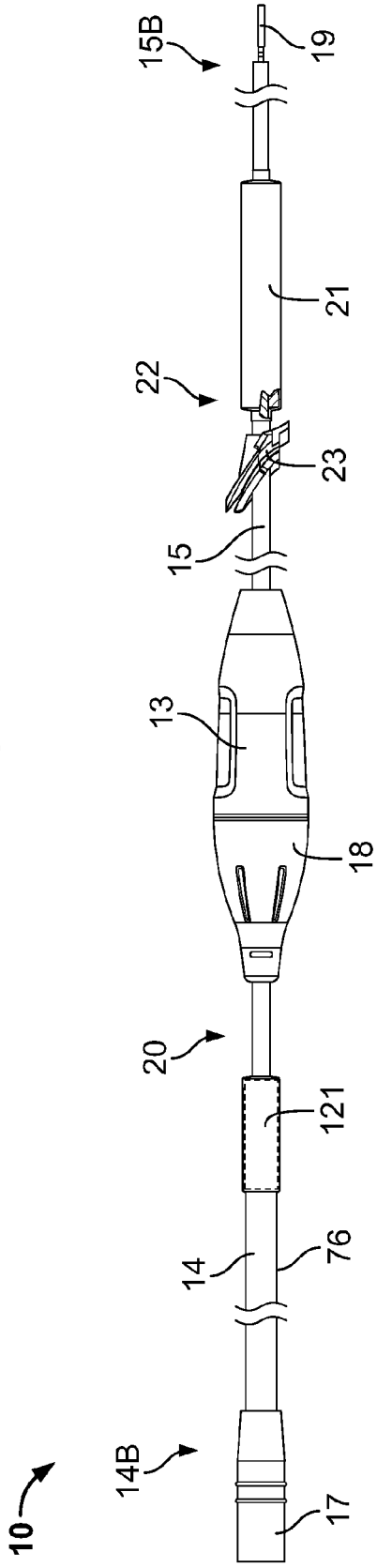

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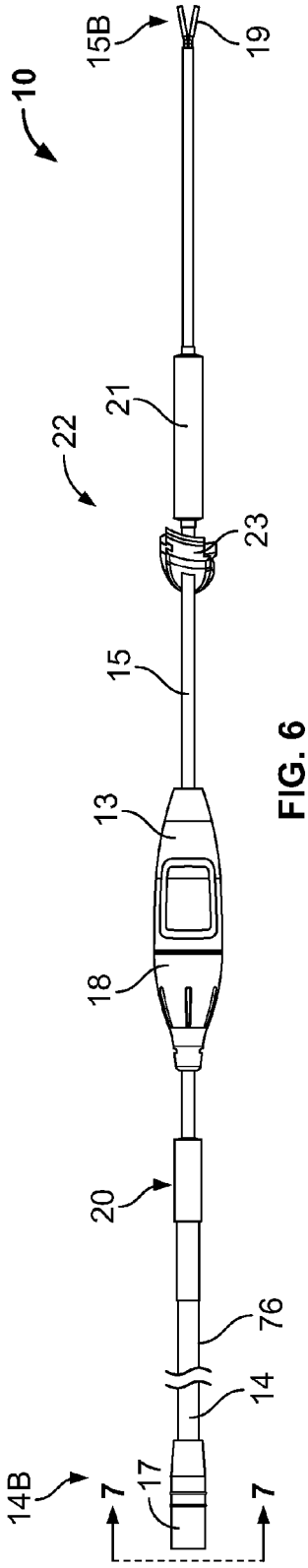

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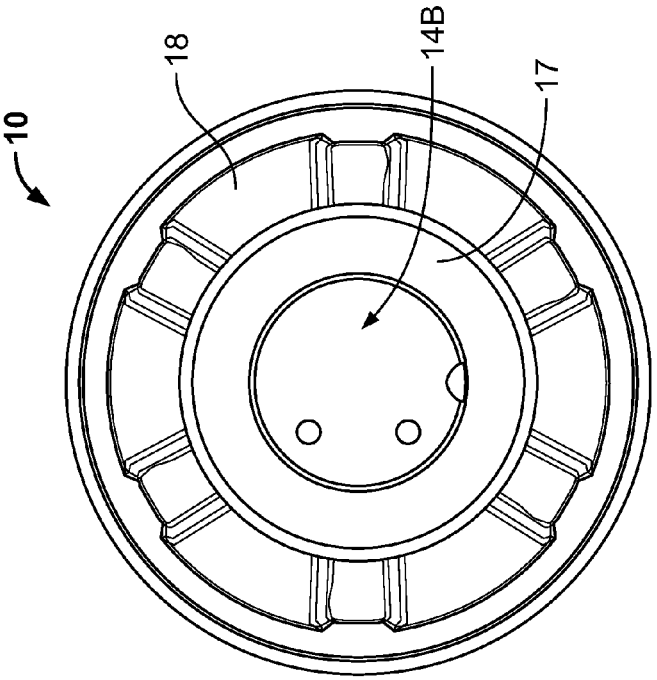

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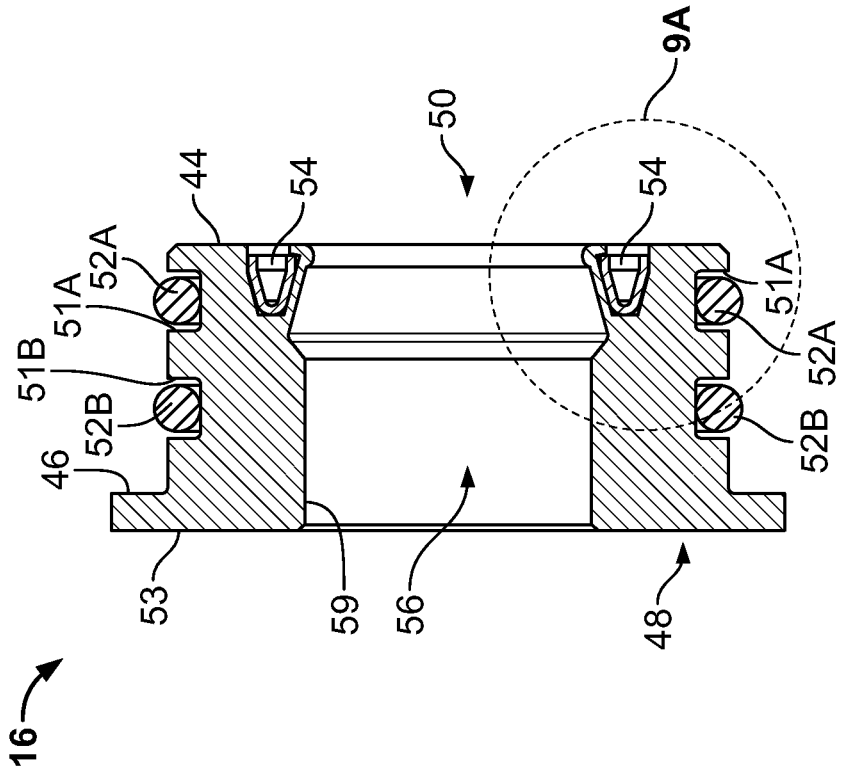

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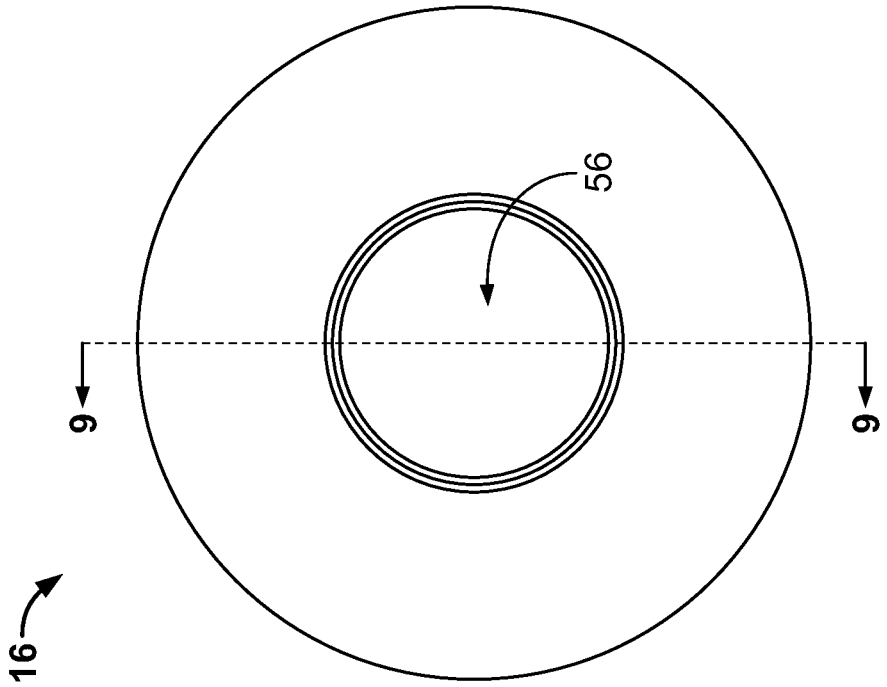

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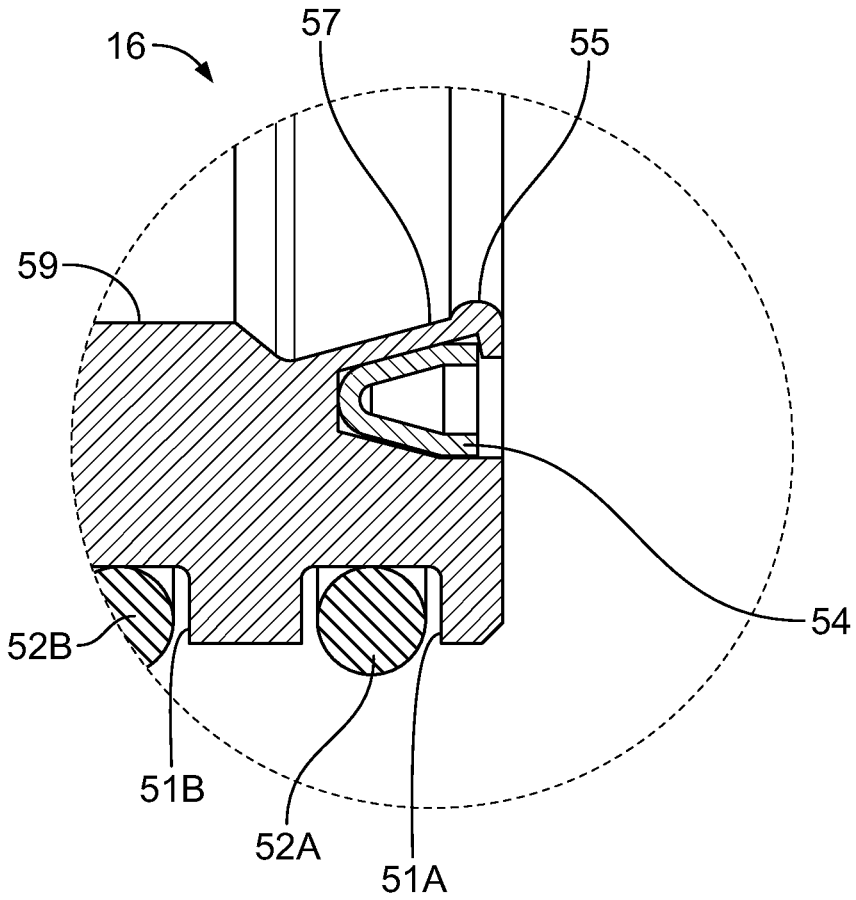

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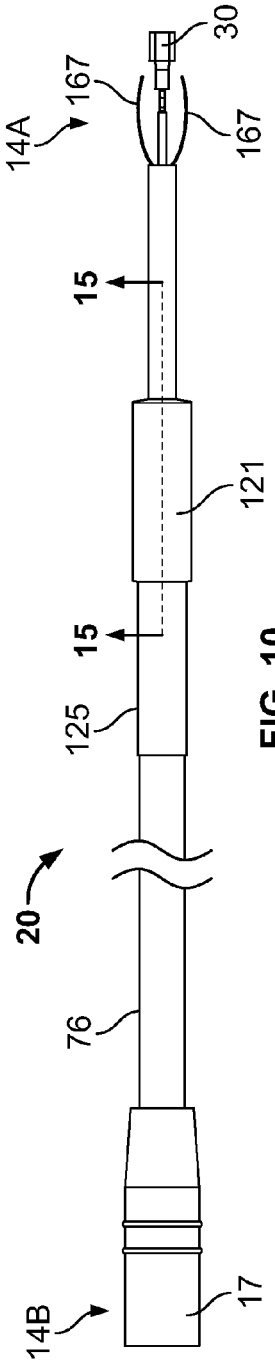

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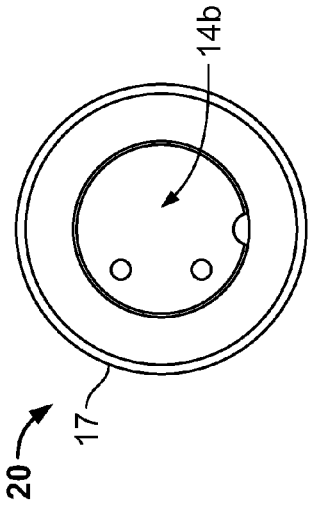

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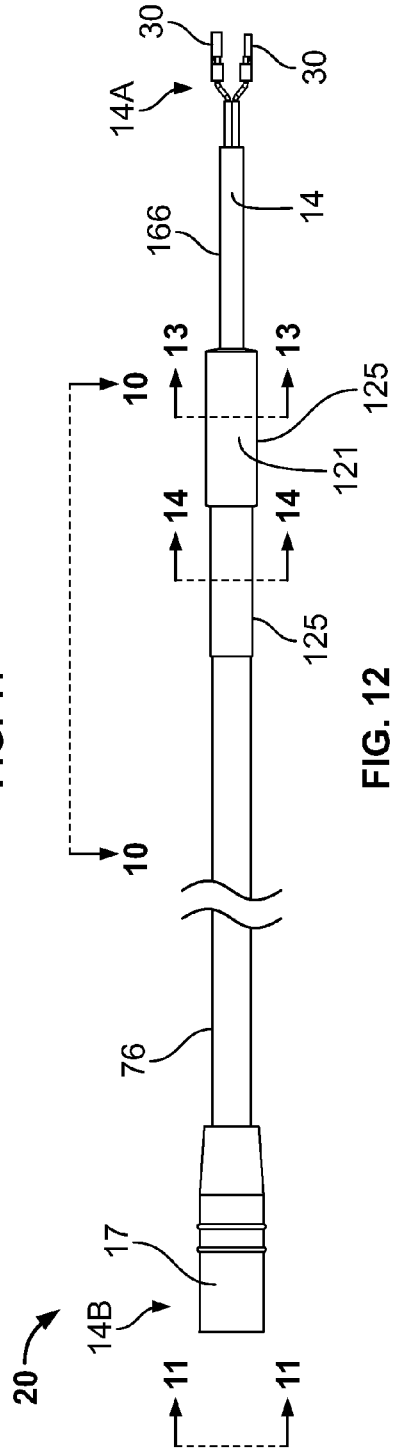

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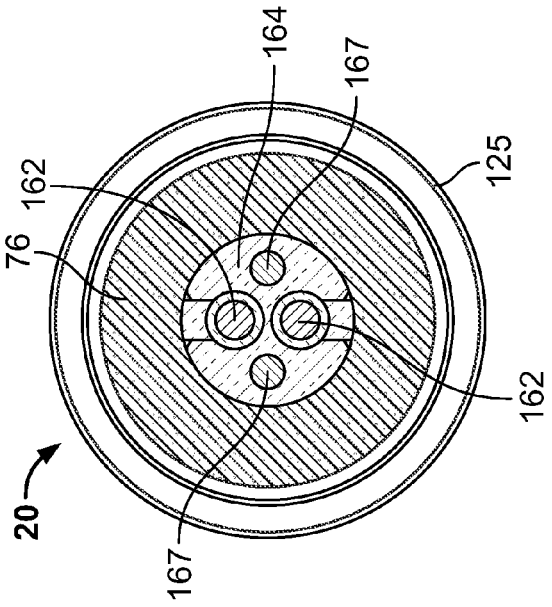

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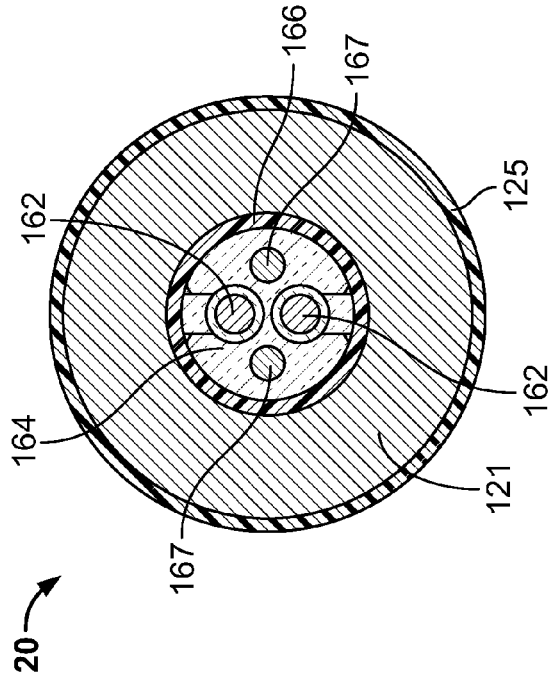

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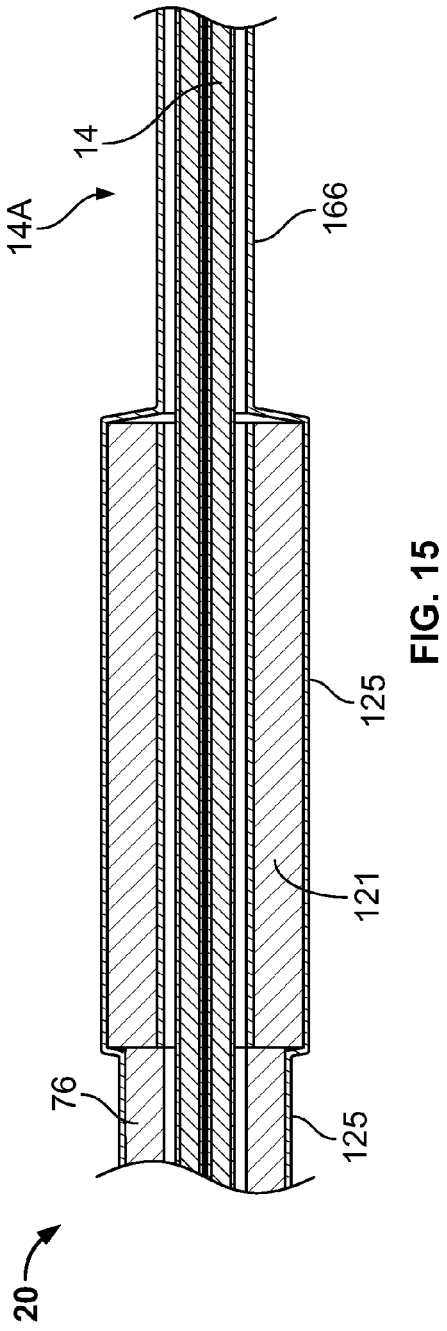

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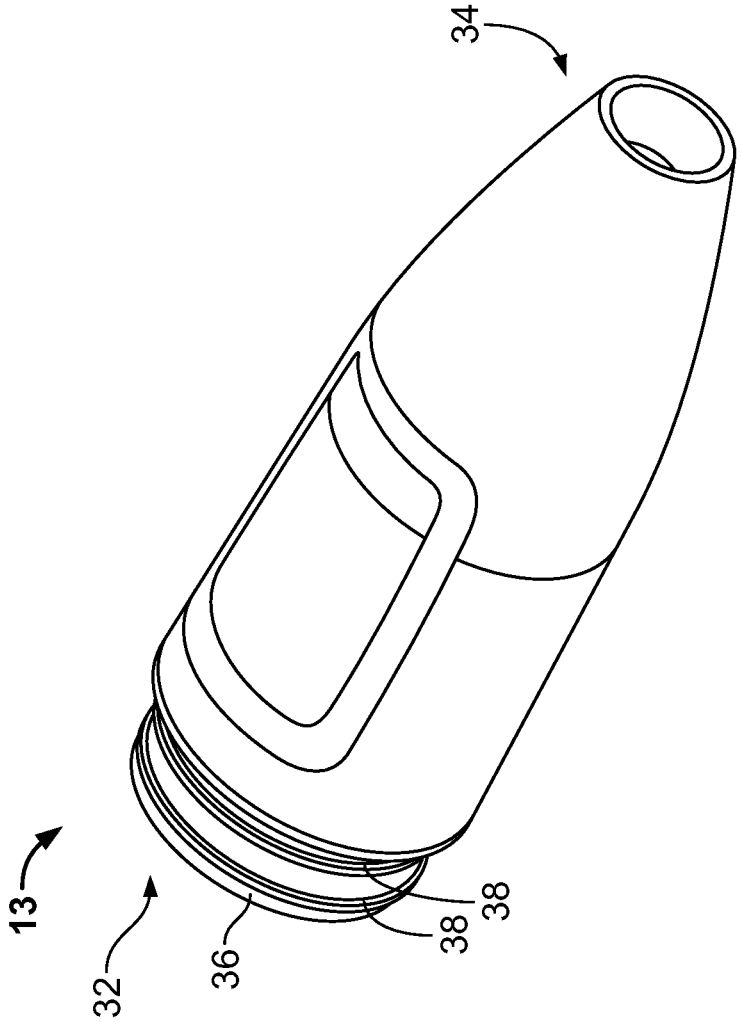

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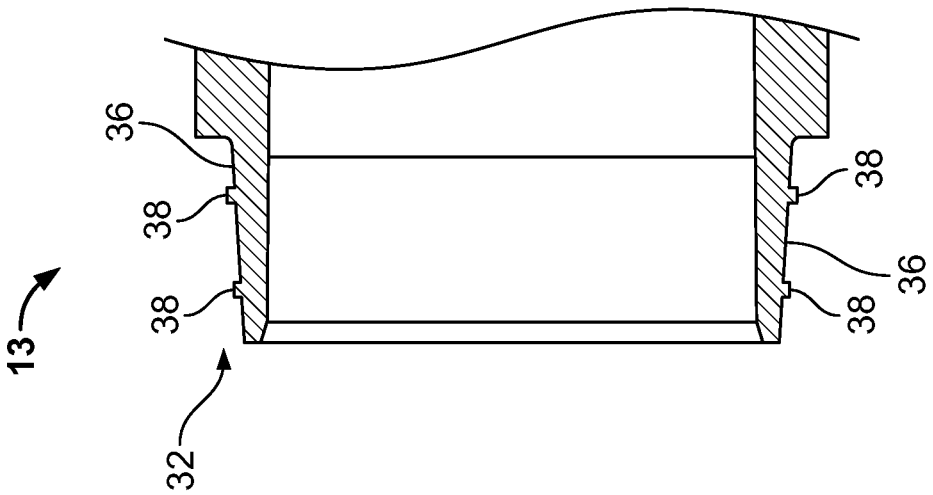

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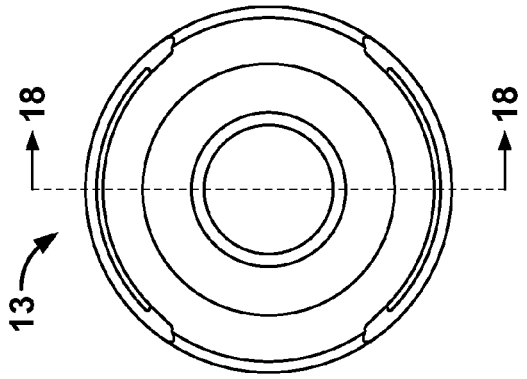

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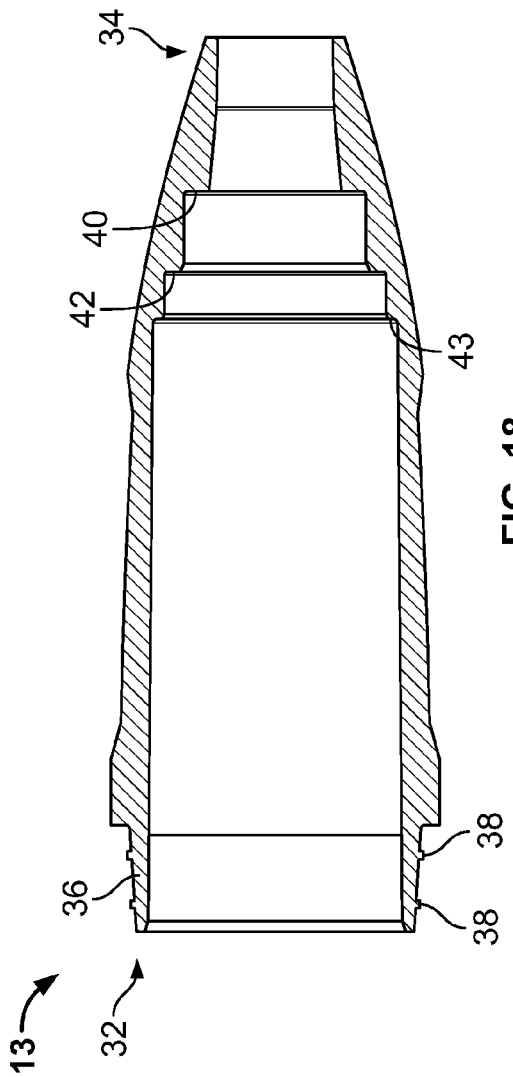

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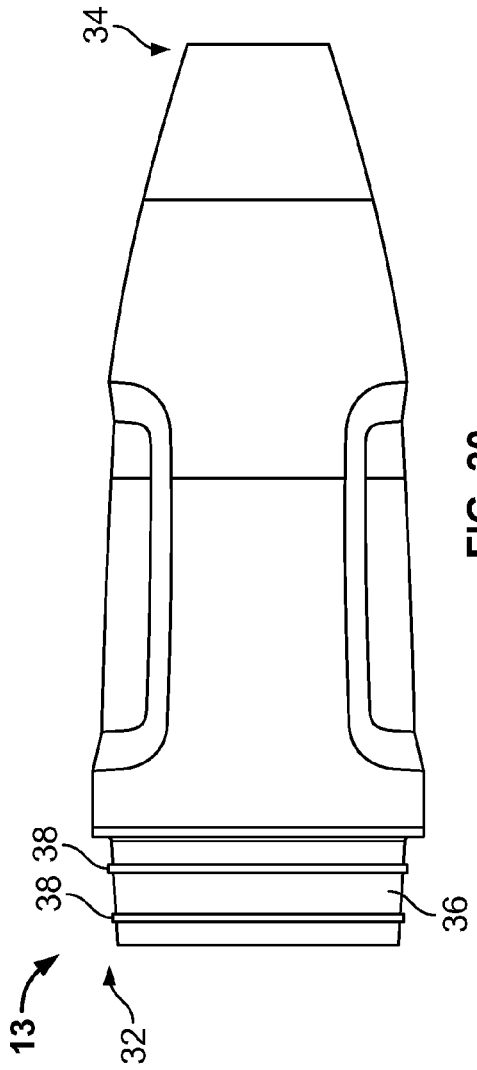

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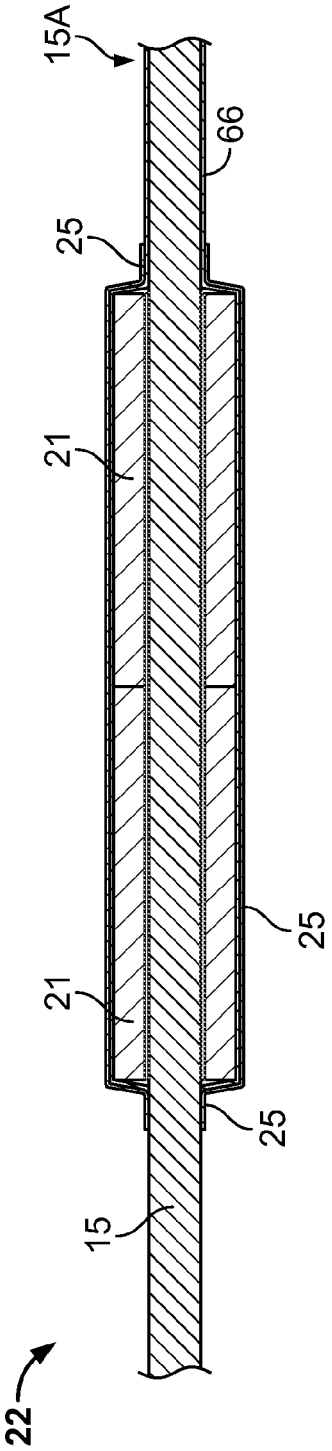

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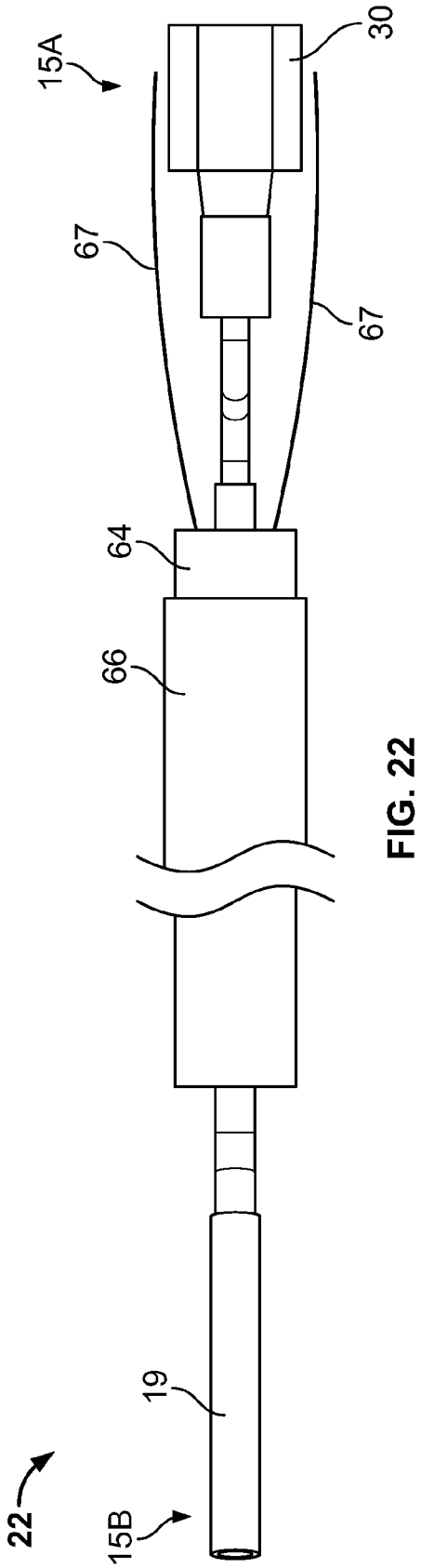

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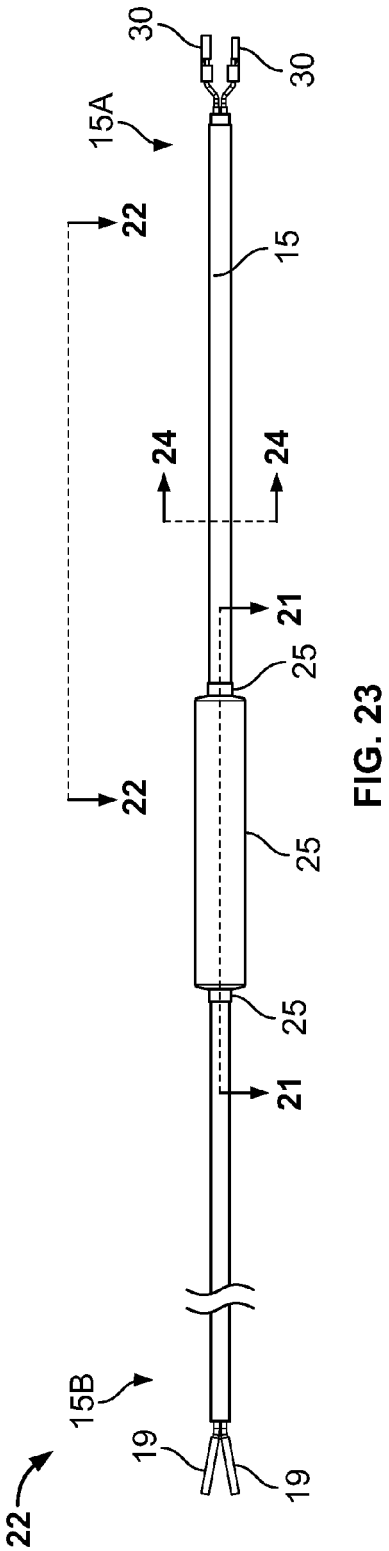
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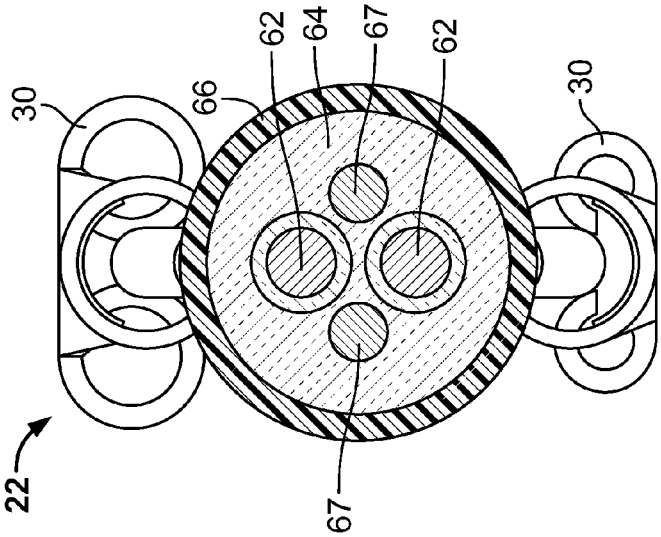
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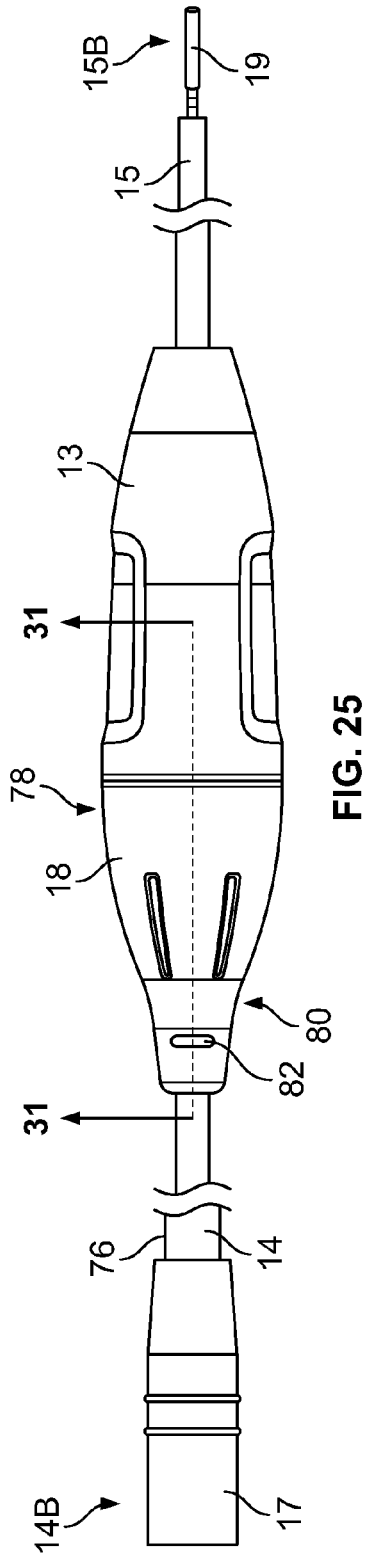

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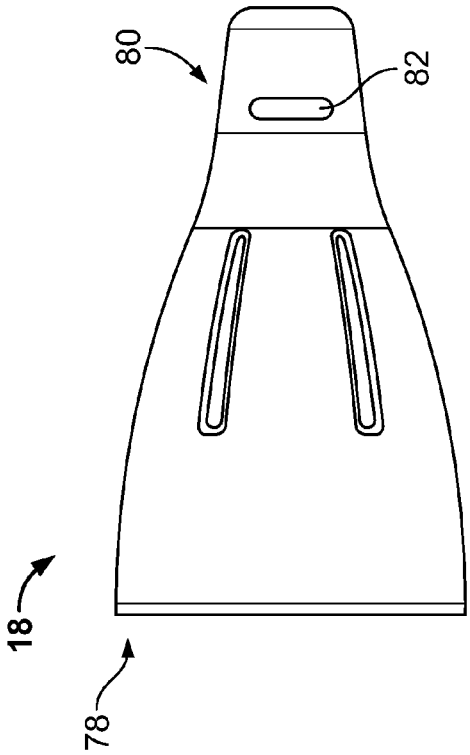

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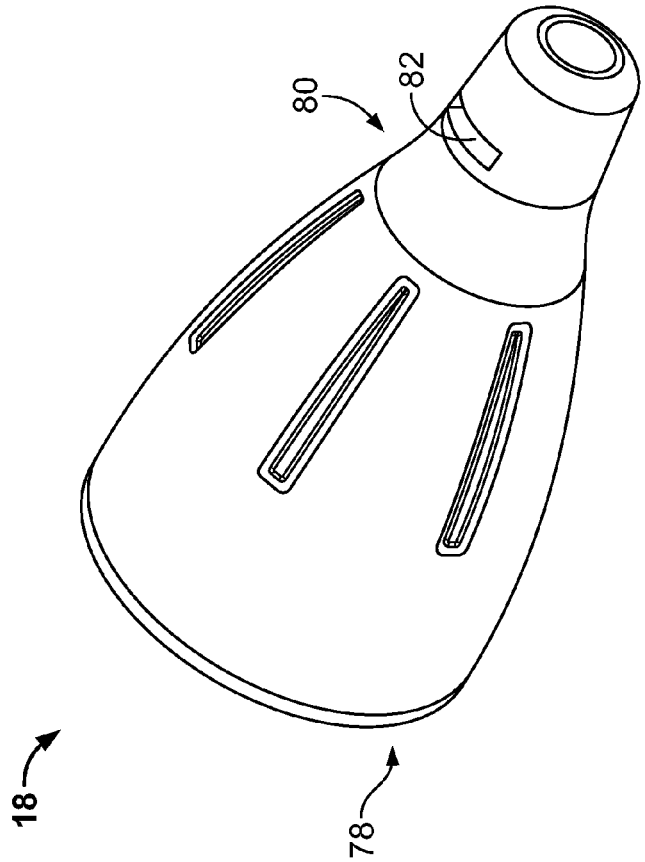

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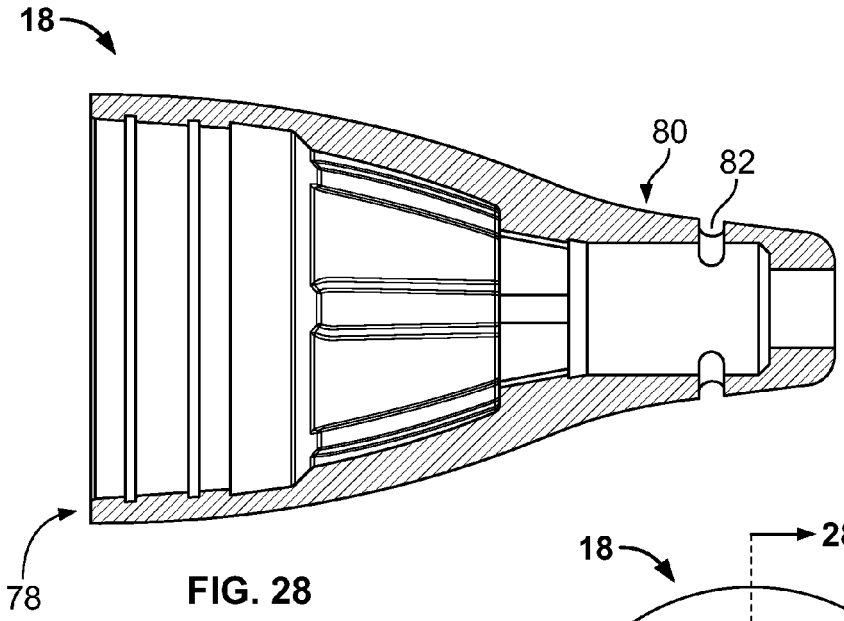

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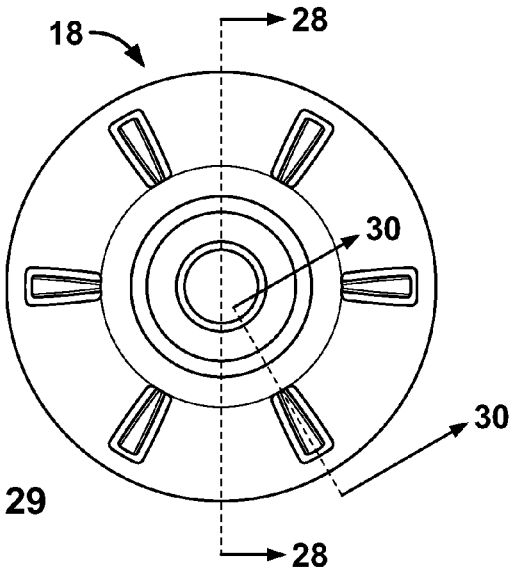

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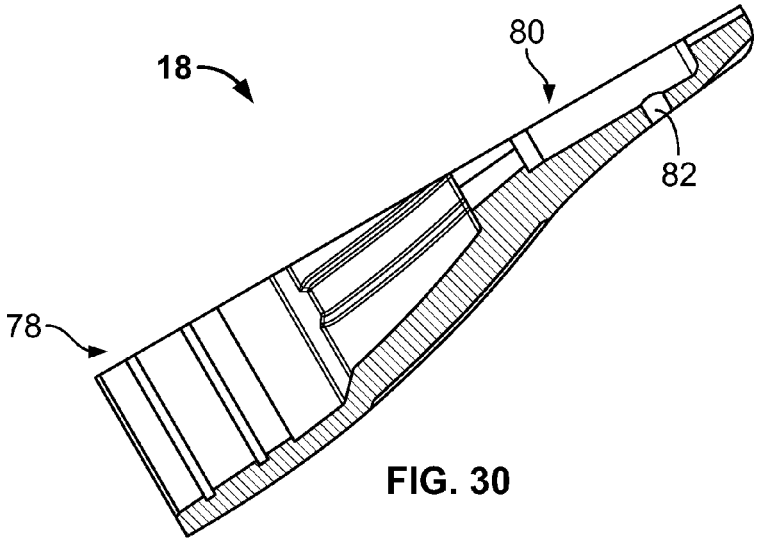

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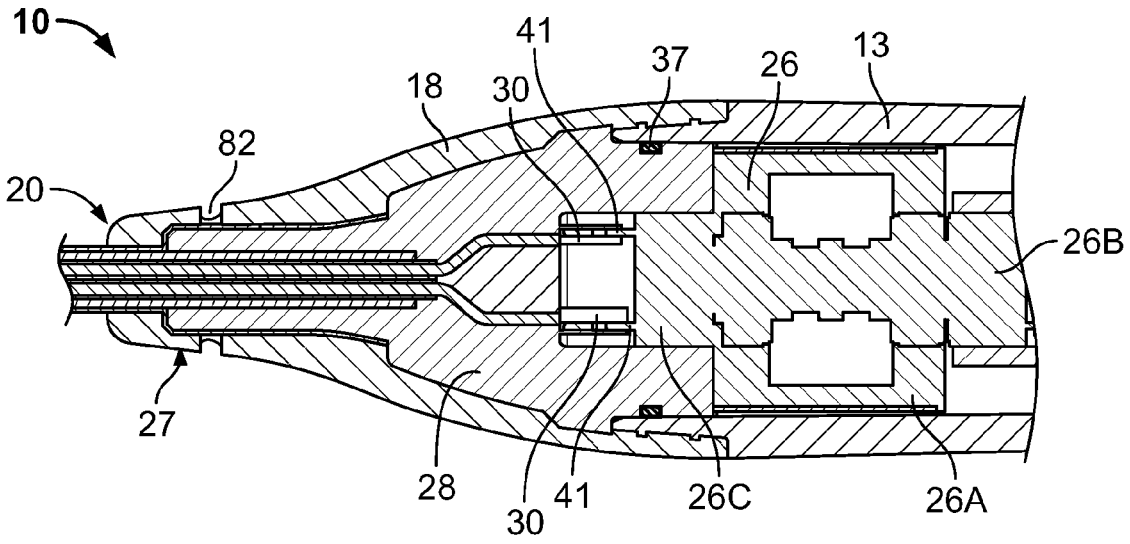
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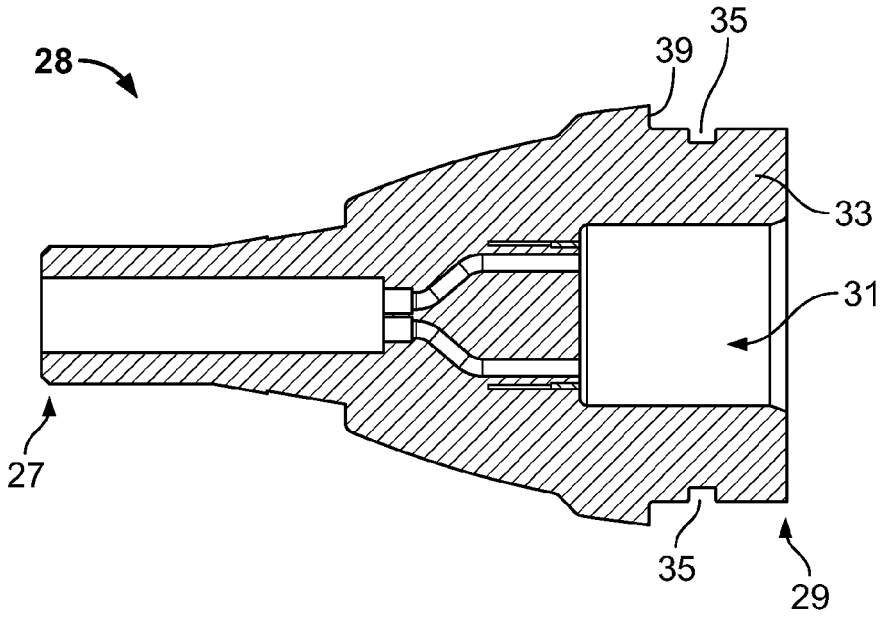
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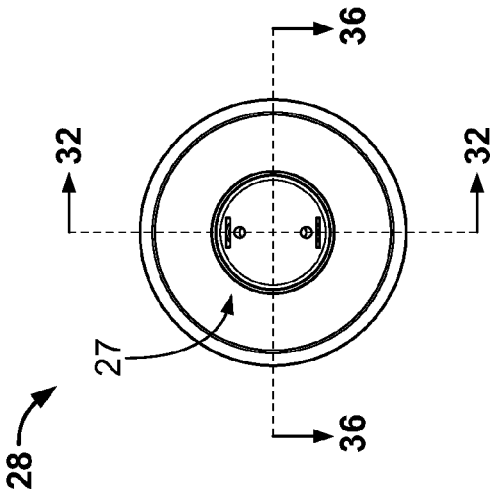


FIG. 33

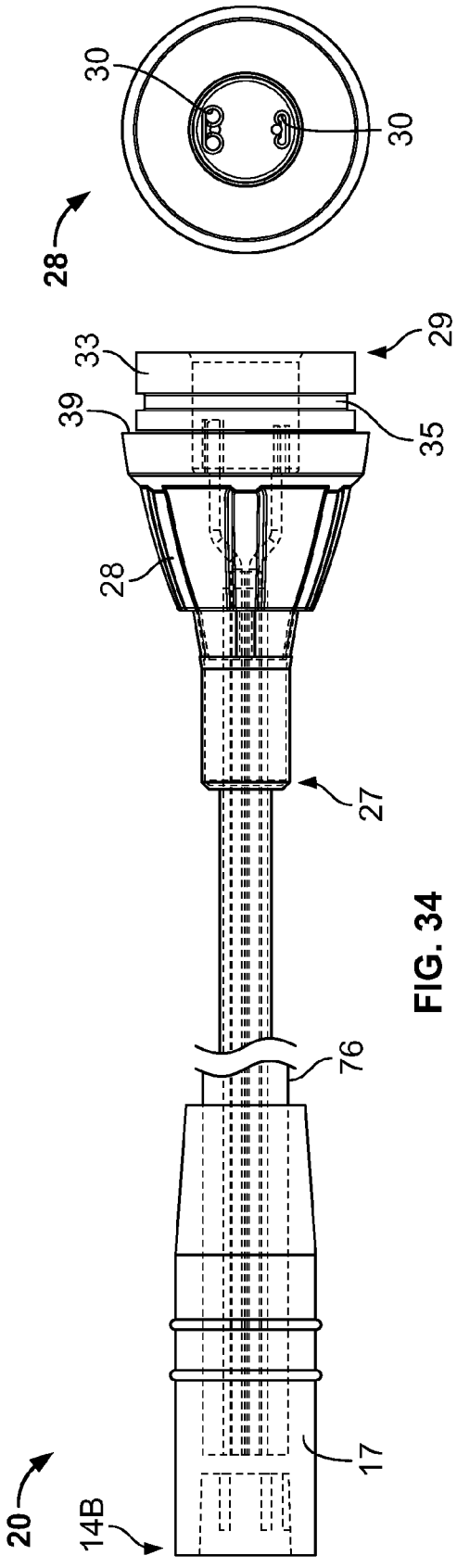
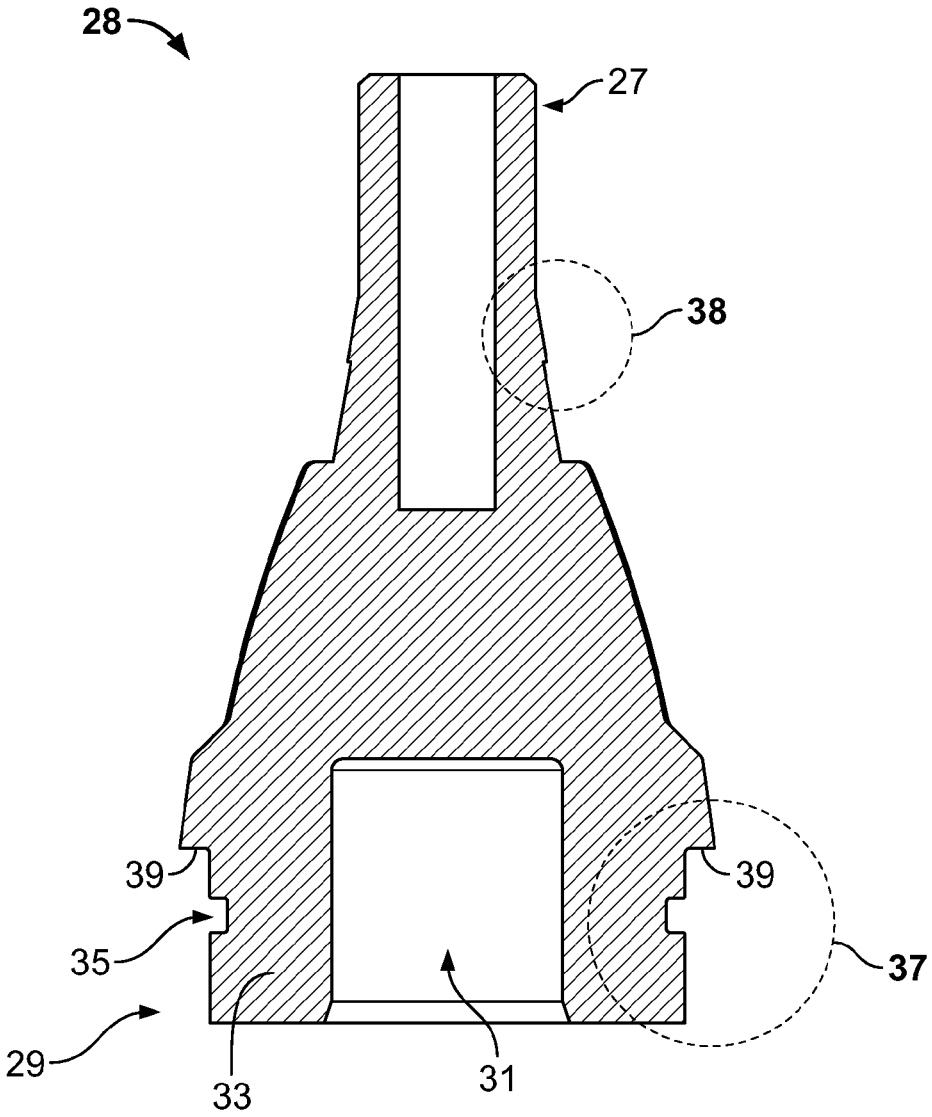


FIG. 34

FIG. 35



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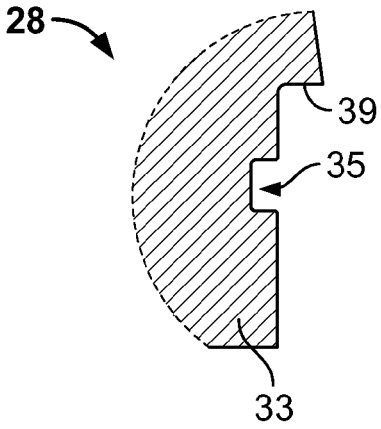

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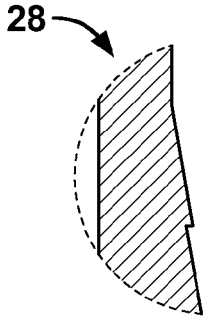


FIG. 38

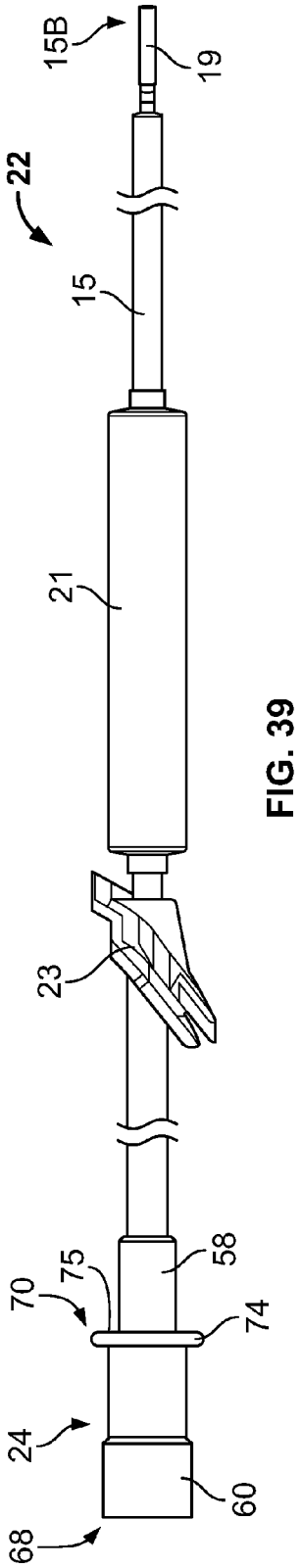
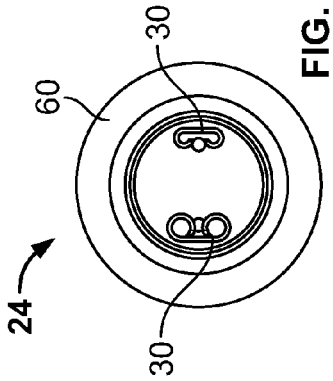


FIG. 39



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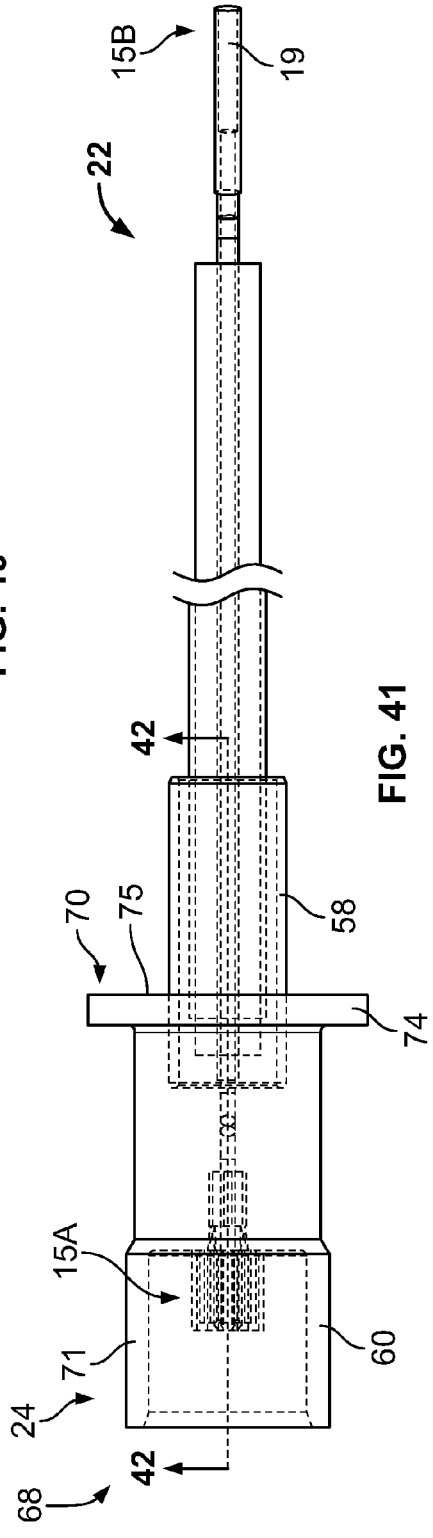

FIG. 41

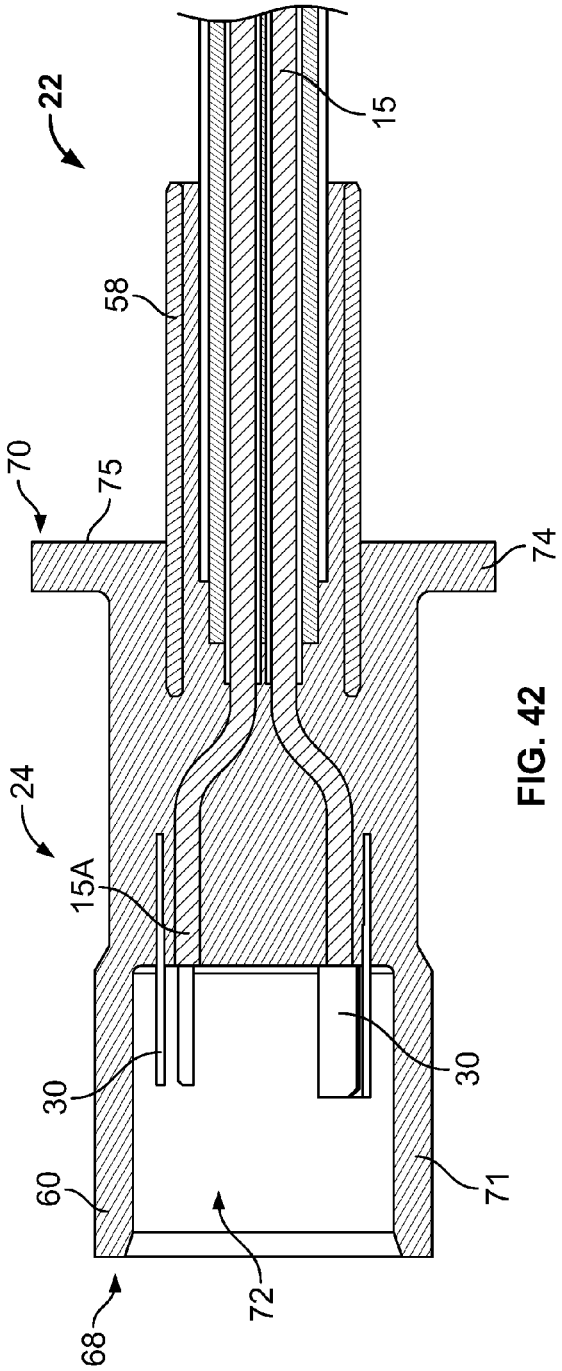

FIG. 42

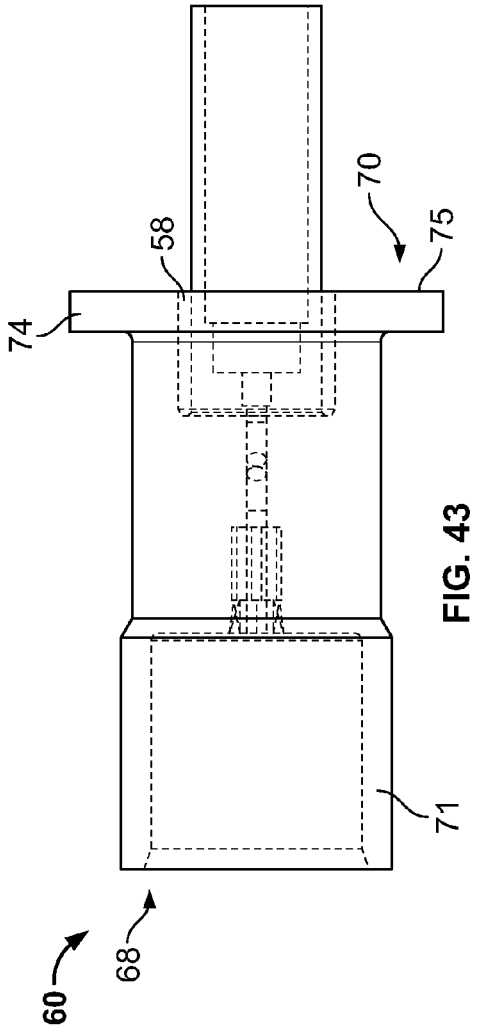

FIG. 43

ELECTRIC CABLE SWIVEL AND RELATED FABRICATION METHODS

BACKGROUND

1. Technical Field

The present disclosure relates to electric cable swivel assemblies and related fabrication methods, and more particularly, to electric cable swivel assemblies configured to reduce entanglement of swimming pool cleaner power/communication cables, and related fabrication methods.

2. Background Art

In general, swimming pool cleaners are known. For example, robotic swimming pool cleaners are generally designed to move along the swimming pool floor and/or walls to clean the surfaces (e.g., from debris, sediment, and the like).

The motion of robotic swimming pool cleaners can be preprogrammed or random motion, or combinations thereof. This may permit a user to activate the swimming pool cleaner and leave it unattended to clean the swimming pool, sometimes without the need for user interaction and/or supervision.

In a swimming pool cleaner of the electrical variety, electrical power is typically provided to the robotic swimming pool cleaner through a power/communication cable extending from the swimming pool cleaner and connecting to a power/communication source in the periphery of the swimming pool. The preprogrammed and/or random motion of swimming pool cleaners with the power cabling associated therewith can create difficulties with respect to power cable entanglement. For example, as the swimming pool cleaner moves along the floor/walls of the swimming pool, the power cables implemented can become twisted/entangled with other power cables, structures around the periphery of the swimming pool, and/or the swimming pool cleaner, thus limiting the motion of the swimming pool cleaner. Moreover, power cable entanglement can create a need for user interaction and/or supervision to ensure that the swimming pool cleaner moves freely along the surface areas of the swimming pool.

Thus, an interest exists for improved electric cable swivel assemblies for reducing entanglement of swimming pool cleaner power cables, and related fabrication methods. These and other inefficiencies and opportunities for improvement are addressed and/or overcome by the assemblies, systems and methods of the present disclosure.

SUMMARY

The present disclosure provides advantageous electric cable swivel assemblies and related fabrication methods. More particularly, the present disclosure provides improved electric cable swivel assemblies configured to reduce entanglement of swimming pool cleaner power cables, and related cable swivel fabrication methods.

In exemplary embodiments, the electric cable swivel assembly includes a swivel body or housing that is configured and dimensioned to mount with respect to a first cable and a second cable. The electric cable swivel assembly is configured to provide a continuous electrical contact between the first and second cables. In general, the electric cable swivel assembly is configured and dimensioned to be assembled together to create a waterproof enclosure for the continuous electrical contact between the first and second cables.

The first and/or second cables are generally axially rotatable relative to each other (e.g., to assist in reducing entanglement of the cables). The first cable can be electrically connected to a power source, and the second cable can be electrically connected to a pool cleaner unit.

In certain embodiments, the electric cable swivel assembly can be attached at an in-line position. In particular, the in-line position typically involves mounting the cable swivel assembly with respect to the first and second cables so that the cable swivel assembly is positioned below the water line.

The present disclosure provides for an electric cable swivel assembly including a housing that extends from a first end to a second end; a seal member configured to mount with respect to the second end of the housing, the seal member extending from a first end to a second end and having an aperture that extends from the first end to the second end; a shaft assembly having an outer member extending from a first end to a second end and having the second end of the outer member mounted with respect to a shaft member and to a first cable assembly associated with a first cable, the shaft member configured to be at least partially housed within the aperture of the seal member and rotatable relative to the seal member and to the housing when the seal member is mounted with respect to the housing; an electrical contact assembly extending from a first end to a second end, the second end of the electrical contact assembly mounted with respect to the first end of the outer member; a support member extending from a first end to a second end and having: (i) the first end of the support member mounted with respect to a second cable assembly associated with a second cable, and (ii) the second end mounted with respect to the first end of the electrical contact assembly; and an overmold member positioned over at least a portion of the housing and the support member, the overmold member configured to hermetically secure the housing and the support member; wherein the electrical contact assembly provides a continuous electrical contact between the first cable and the second cable; and wherein the first cable can rotate axially relative to the second cable.

The present disclosure also provides for an electric cable swivel assembly wherein the first cable extends from a first end to a second end, the first end of the first cable mounted with respect to the outer member and the second end of the first cable mounted with respect to a pool cleaner unit; and wherein the second cable extends from a first end to a second end, the first end of the second cable mounted with respect to the support member and the second end of the second cable mounted with respect to a power source.

The present disclosure also provides for an electric cable swivel assembly wherein the first end of the housing includes at least one rib member that extends from the first end of the housing, the at least one rib member configured to engage the overmold member to facilitate the hermetic securement of the housing. The present disclosure also provides for an electric cable swivel assembly wherein the second end of the housing includes a first shelf surface and a second shelf surface; wherein the seal member includes a first contact surface and a second contact surface; and wherein when the seal member is mounted with respect to the housing, the first shelf surface of the housing engages the first contact surface of the seal member, and the second shelf surface of the housing engages the second contact surface of the seal member.

The present disclosure also provides for an electric cable swivel assembly wherein an outer surface of the seal member includes a first groove that houses a first gasketing material, and a second groove that houses a second gasketing material; and wherein when the seal member is mounted with respect to the housing, the first and second gasketing materials form a fluid-tight seal between the seal member and the housing.

The present disclosure also provides for an electric cable swivel assembly wherein the seal member includes a spring-

loaded sealing surface that extends around and proximal to the aperture of the seal member; and wherein when the shaft member is housed within the aperture of the seal member, the spring-loaded sealing surface of the seal member provides a fluid-tight seal between the seal member and the shaft member while allowing the shaft member to rotate relative to the seal member.

The present disclosure also provides for an electric cable swivel assembly wherein the shaft member is substantially tubular; wherein a portion of the first cable is positioned within the shaft member; and wherein the outer member of the shaft assembly is an internal overmold member that is positioned around at least a portion of the shaft member and the first cable to secure the outer member, shaft member and first cable relative to one another. The present disclosure also provides for an electric cable swivel assembly wherein the second end of the outer member includes a protruding section that abuts an abutment surface of the seal member when the shaft member is housed within the aperture of the seal member.

The present disclosure also provides for an electric cable swivel assembly wherein the first and second cable assemblies include at least one electromagnetic interference suppression member. The present disclosure also provides for an electric cable swivel assembly wherein the support member is an internal overmold member that is positioned around at least a portion of the second cable to secure the support member and the second cable relative to one another.

The present disclosure also provides for an electric cable swivel assembly wherein an outer surface of the second end of the support member includes a groove that houses a gasketing material; wherein the second end of the support member includes an abutment surface; wherein when the housing and the support member are hermetically secured, the abutment surface abuts against the first end of the housing, and the gasketing material provides a seal between the support member and the housing.

The present disclosure also provides for a method for fabricating an electric cable swivel assembly for a swimming pool cleaner power cable including providing a housing that extends from a first end to a second end; providing a seal member, the seal member extending from a first end to a second end and having an aperture that extends from the first end to the second end; mounting the seal member with respect to the second end of the housing; providing a shaft assembly having an outer member extending from a first end to a second end; mounting the second end of the outer member with respect to a shaft member and to a first cable assembly associated with a first cable; housing at least a portion of the shaft member within the aperture of the seal member so that the shaft member is rotatable relative to the seal member and to the housing after the seal member is mounted with respect to the housing; providing an electrical contact assembly extending from a first end to a second end; mounting the second end of the electrical contact assembly with respect to the first end of the outer member; providing a support member extending from a first end to a second end; mounting the first end of the support member with respect to a second cable assembly associated with a second cable; mounting the second end of the support member with respect to the first end of the electrical contact assembly; and overmolding an overmold member over at least a portion of the housing and the support member to hermetically secure the housing and the support member; wherein the electrical contact assembly provides a continuous electrical contact between the first cable and the second cable; and wherein the first cable can rotate axially relative to the second cable.

The present disclosure also provides for a method for fabricating an electric cable swivel assembly for a swimming pool cleaner power cable wherein the first cable extends from a first end to a second end, the first end of the first cable mounted with respect to the outer member and the second end of the first cable mounted with respect to a pool cleaner unit; and wherein the second cable extends from a first end to a second end, the first end of the second cable mounted with respect to the support member and the second end of the second cable mounted with respect to a power source.

The present disclosure also provides for a method for fabricating an electric cable swivel assembly for a swimming pool cleaner power cable wherein the first end of the housing includes at least one rib member that extends from the first end of the housing, the at least one rib member configured to engage the overmold member to facilitate the hermetic securement of the housing. The present disclosure also provides for a method for fabricating an electric cable swivel assembly for a swimming pool cleaner power cable wherein the second end of the housing includes a first shelf surface and a second shelf surface; wherein the seal member includes a first contact surface and a second contact surface; and wherein when the seal member is mounted with respect to the housing, the first shelf surface of the housing engages the first contact surface of the seal member, and the second shelf surface of the housing engages the second contact surface of the seal member.

The present disclosure also provides for a method for fabricating an electric cable swivel assembly for a swimming pool cleaner power cable wherein an outer surface of the seal member includes a first groove that houses a first gasketing material, and a second groove that houses a second gasketing material; and wherein when the seal member is mounted with respect to the housing, the first and second gasketing materials form a fluid-tight seal between the seal member and the housing.

The present disclosure also provides for a method for fabricating an electric cable swivel assembly for a swimming pool cleaner power cable wherein the seal member includes a spring-loaded sealing surface that extends around and proximal to the aperture of the seal member; and wherein when the shaft member is housed within the aperture of the seal member, the spring-loaded sealing surface of the seal member provides a fluid-tight seal between the seal member and the shaft member while allowing the shaft member to rotate relative to the seal member.

The present disclosure also provides for a method for fabricating an electric cable swivel assembly for a swimming pool cleaner power cable wherein the shaft member is substantially tubular; wherein a portion of the first cable is positioned within the shaft member; and wherein the outer member is an overmold member that is positioned around at least a portion of the shaft member and the first cable to secure the overmold member, shaft member and first cable relative to one another.

The present disclosure also provides for a method for fabricating an electric cable swivel assembly for a swimming pool cleaner power cable wherein the second end of the outer member includes a protruding section that abuts an abutment surface of the seal member when the shaft member is housed within the aperture of the seal member. The present disclosure also provides for a method for fabricating an electric cable swivel assembly for a swimming pool cleaner power cable wherein the first and second cable assemblies include at least one electromagnetic interference suppression member.

The present disclosure also provides for a method for fabricating an electric cable swivel assembly for a swimming

pool cleaner power cable wherein the support member is an internal overmold member that is positioned around at least a portion of the second cable to secure the support member and the second cable relative to one another. The present disclosure also provides for a method for fabricating an electric cable swivel assembly for a swimming pool cleaner power cable wherein an outer surface of the second end of the support member includes a groove that houses a gasketing material; wherein the second end of the support member includes an abutment surface; wherein when the housing and the support member are hermetically secured, the abutment surface abuts against the first end of the housing, and the gasketing material provides a seal between the support member and the housing.

The present disclosure also provides for an electric cable swivel assembly fabricated according to the steps including providing a housing that extends from a first end to a second end; providing a seal member, the seal member extending from a first end to a second end and having an aperture that extends from the first end to the second end; mounting the seal member with respect to the second end of the housing; providing a shaft assembly having an outer member extending from a first end to a second end; mounting the second end of the outer member with respect to a shaft member and to a first cable assembly associated with a first cable; housing at least a portion of the shaft member within the aperture of the seal member so that the shaft member is rotatable relative to the seal member and to the housing after the seal member is mounted with respect to the housing; providing an electrical contact assembly extending from a first end to a second end; mounting the second end of the electrical contact assembly with respect to the first end of the outer member; providing a support member extending from a first end to a second end; mounting the first end of the support member with respect to a second cable assembly associated with a second cable; mounting the second end of the support member with respect to the first end of the electrical contact assembly; and overmolding an overmold member over at least a portion of the housing and the support member to hermetically secure the housing and the support member; wherein the electrical contact assembly provides a continuous electrical contact between the first cable and the second cable; and wherein the first cable can rotate axially relative to the second cable.

Any combination or permutation of embodiments is envisioned. Additional advantageous features, functions and applications of the disclosed assemblies, systems and methods of the present disclosure will be apparent from the description which follows, particularly when read in conjunction with the appended figures. All references listed in this disclosure are hereby incorporated by reference in their entireties.

BRIEF DESCRIPTION OF THE DRAWINGS

Features and aspects of embodiments are described below with reference to the accompanying drawings, in which elements are not necessarily depicted to scale.

Exemplary embodiments of the present disclosure are further described with reference to the appended figures. It is to be noted that the various steps, features/components and combinations of steps/features/components described below and illustrated in the figures can be arranged and organized differently to result in embodiments which are still within the scope of the present disclosure. To assist those of ordinary skill in the art in making and using the disclosed systems, assemblies and methods, reference is made to the appended figures, wherein:

FIG. **1** depicts an exemplary electric cable swivel assembly and cleaner unit according to the present disclosure;

FIG. **2** is an exploded side perspective view of an exemplary electric cable swivel assembly, prior to assembly;

FIG. **3** is a partial cross-sectional view of the cable swivel assembly of FIG. **2**, after assembly, and taken along the line **3-3** of FIG. **4**;

FIG. **4** is an end view of the cable swivel assembly of FIG. **2**, after assembly;

FIG. **5** is a side view of the cable swivel assembly of FIG. **2**, after assembly;

FIG. **6** is another side view of the cable swivel assembly of FIG. **5**;

FIG. **7** is an end view of the cable swivel assembly of FIG. **6**;

FIG. **8** is an end view an exemplary seal member for use with the cable swivel assembly of FIG. **2**;

FIG. **9** is a cross-sectional side view of the seal member of FIG. **8**;

FIG. **9**A is an exploded partial view of the seal member of FIG. **9**;

FIG. **10** is a partial side view of an exemplary power cable assembly for use with the cable swivel assembly of FIG. **2**;

FIG. **11** is an end view of the power cable assembly of FIG. **10**;

FIG. **12** is another partial side view of the power cable assembly of FIG. **10**;

FIG. **13** is a cross-sectional view of the power cable assembly of FIG. **12**, and taken along the line **13-13** of FIG. **12**;

FIG. **14** is a cross-sectional view of the power cable assembly of FIG. **12**, and taken along the line **14-14** of FIG. **12**;

FIG. **15** is a partial cross-sectional view of the power cable assembly of FIG. **10**, and taken along the line **15-15** of FIG. **10**;

FIG. **16** is a partial cross-sectional view of an exemplary swivel housing for use with the cable swivel assembly of FIG. **2**, and taken along the line **18-18** of FIG. **19**;

FIG. **17** is a side perspective view of the swivel housing of FIG. **2**;

FIG. **18** is a cross-sectional view of the swivel housing of FIG. **17**, and taken along the line **18-18** of FIG. **19**;

FIG. **19** is an end view of the swivel housing of FIG. **17**;

FIG. **20** is a side view of the swivel housing of FIG. **17**;

FIG. **21** is a partial cross-sectional view of an exemplary cable assembly for use with the cable swivel assembly of FIG. **2**, and taken along the line **21-21** of FIG. **23**;

FIG. **22** is a partial side view of the cable assembly of FIG. **2**;

FIG. **23** is another partial side view of the cable assembly of FIG. **22**;

FIG. **24** is a cross-sectional view of the cable assembly of FIG. **23**, and taken along the line **24-24** of FIG. **23**;

FIG. **25** is another side view of the cable swivel assembly of FIG. **2**, after assembly;

FIG. **26** is a side perspective view of an exemplary overmold member for use with the cable swivel assembly of FIG. **2**;

FIG. **27** is a side view of the overmold member of FIG. **26**;

FIG. **28** is a cross-sectional view of the overmold member of FIG. **26**, and taken along the line of **28-28** of FIG. **29**;

FIG. **29** is an end view of the overmold member of FIG. **26**;

FIG. **30** is a partial cross-sectional view of the overmold member of FIG. **26**, and taken along the line of **30-30** of FIG. **29**;

FIG. **31** is a partial cross-sectional view of the cable swivel assembly of FIG. **25**, and taken along the line **31-31** of FIG. **25**;

FIG. **32** is a cross-sectional view of an exemplary receiver member for use with the cable swivel assembly of FIG. **2**, and taken along the line **32-32** of FIG. **33**;

FIG. **33** is an end view of the receiver member of FIG. **32**;

FIG. **34** is a partial side view of the receiver member of FIG. **32** and the power cable assembly of FIG. **10**;

FIG. **35** is another end view of the receiver member of FIG. **32**;

FIG. **36** is a cross-sectional view of the receiver member of FIG. **32**, and taken along the line **36-36** of FIG. **33**;

FIGS. **37-38** are partial exploded views of the receiver member of FIG. **36**;

FIG. **39** is a partial side view of an exemplary shaft assembly for use with the cable swivel assembly of FIG. **2**, along with the cable assembly of FIG. **23**;

FIG. **40** is an end view of the shaft assembly of FIG. **39**;

FIG. **41** is another partial side view of the shaft assembly and the cable assembly of FIG. **39**;

FIG. **42** is a partial cross-sectional view of the shaft assembly and the cable assembly of FIG. **41**, and taken along the line **42-42** of FIG. **41**; and

FIG. **43** is another partial side view of the shaft assembly of FIG. **39**.

DETAILED DESCRIPTION

The exemplary embodiments disclosed herein are illustrative of advantageous electric cable swivel assemblies, and systems of the present disclosure and methods/techniques thereof. It should be understood, however, that the disclosed embodiments are merely exemplary of the present disclosure, which may be embodied in various forms. Therefore, details disclosed herein with reference to exemplary electric cable swivel assemblies/fabrication methods and associated processes/techniques of assembly and/or use are not to be interpreted as limiting, but merely as the basis for teaching one skilled in the art how to make and use the advantageous electric cable swivel assemblies of the present disclosure.

The present disclosure provides improved electric cable swivel assemblies and related fabrication methods. In general, the present disclosure provides improved electric cable swivel assemblies configured to reduce entanglement of swimming pool cleaner power cables, and related cable swivel fabrication methods. In exemplary embodiments, the present disclosure provides for a electric cable swivel assembly including a swivel body/housing that is configured and dimensioned to mount with respect to a first cable and a second cable. The electric cable swivel assembly is configured to provide a continuous electrical contact between the first and second cables, wherein the first and/or second cables are generally axially rotatable relative to each other (e.g., to assist in reducing entanglement of the cables). The first cable can be electrically connected to a power source, and the second cable can be electrically connected to a pool cleaner unit. In general, the cable swivel assembly can prevent the cables from tangling, and allows continuous current supply and communication to the pool cleaner from the power source.

Current practice provides that the motion of swimming pool cleaners and their associated power cables can create difficulties with respect to power cable entanglement. For example, as the swimming pool cleaner moves along the pool, the various power cables utilized can become twisted/entangled (e.g., with other power cables and/or structures, and/or with the swimming pool cleaner), thus limiting the motion of the cleaner, thereby creating a need for user interaction/supervision to ensure that the cleaner moves freely. In exemplary embodiments, the present disclosure provides for improved electric cable swivel assemblies for reducing entanglement of swimming pool cleaner power cables, thereby providing a significant operational, commercial and/or manufacturing advantage as a result.

Referring now to the drawings, like parts are marked throughout the specification and drawings with the same reference numerals, respectively. Drawing figures are not necessarily to scale and in certain views, parts may have been exaggerated for purposes of clarity.

With reference to the drawings, and in particular to FIG. **1**, there is illustrated an electric cable swivel assembly **10** depicting an embodiment of the present disclosure. In general, cable swivel assembly **10** is configured and dimensioned to reduce entanglement of cables **14**, **15** (e.g., swimming pool cleaner power cables **14**, **15**) or the like.

Electric cable swivel assembly **10** can be mounted with respect to a cleaner unit **12** (e.g., robotic swimming pool cleaner unit **12**) for cleaning purposes. For example, cable swivel assembly **10** may be mounted with respect to (e.g., via cables **14**, **15**) a robotic swimming pool cleaner unit **12** for use in cleaning surfaces of a swimming pool or the like. However, it is noted that exemplary cable swivel assembly **10** is capable of use with other cleaner units or the like for various cleaning purposes (e.g., for use in cleaning surfaces of a spa, tub, tank, fluid system, etc.).

In exemplary embodiments, the electric cable swivel assembly includes a swivel body or housing **13** that is configured and dimensioned to mount with respect to first cable **14** and to second cable **15**. In general, cable swivel assembly **10** is configured to provide a continuous electrical contact between the first and second cables **14**, **15**. Exemplary cable swivel assembly **10** is configured and dimensioned to be assembled together to create a waterproof enclosure for the continuous electrical contact between the first and second cables **14**, **15**. Stated another way, the cable swivel assembly **10** includes and houses the components that create an electrical connection between the first and second cables **14**, **15**.

The first and/or second cables **14**, **15** are generally axially rotatable relative to each other (e.g., to assist in reducing entanglement of cables **14**, **15**). The first cable **14** can extend to and be electrically connected to a power source (e.g., a power source/electric outlet in the periphery of the swimming pool), and the second cable **15** can extend to and be electrically connected to pool cleaner unit **12**. As such, exemplary cables **14**, **15** can extend from cable swivel assembly **10** to the power source and the cleaner unit **12**, respectively. In general, cable swivel assembly **10** is configured and dimensioned to prevent the cables **14**, **15** from tangling, and allows continuous current supply and communication to the cleaner unit **12** from the power source.

In certain embodiments, the electric cable swivel assembly **10** can be attached at an in-line position. In particular, the in-line position typically involves mounting the cable swivel assembly **10** with respect to the first and second cables **14**, **15** so that the cable swivel assembly **10** is positioned below the water line **11**, although the present disclosure is not limited thereto. Rather, it is noted that cable swivel assembly **10** can be positioned at a variety of locations/positions (e.g., proximal to water line **11**, proximal to cleaner unit **12**, above water line **11**, proximal to a skimmer, etc.).

As shown in FIGS. **2-9** and as discussed in further detail below, electric cable swivel assembly **10** typically includes swivel body/housing **13**, seal member **16**, overmold member **18**, power cable assembly **20**, cleaner cable assembly **22**, shaft assembly **24**, electrical contact assembly **26** (e.g., slip ring assembly **26**) and support member **28**.

In exemplary embodiments, electric cable swivel assembly **10** is configured and dimensioned to secure and/or mount with respect to at least a portion of first and second cables **14**, **15** so that the first and/or second cables **14**, **15** can axially rotate relative to one another. As noted, first cable **14** can extend to and be electrically connected to a power source, and second cable **15** can extend to and be electrically connected to pool cleaner unit **12**.

In exemplary embodiments and as discussed further below, at least some of the components of the second cable **15**, shaft assembly **24**, cleaner cable assembly **22** and/or the electrical contact assembly **26** rotate (e.g., axially rotate) relative to at least some of the other components of cable swivel assembly **10**. In general, the rotating components are configured to axially rotate while maintaining an electrical connection between the first and second cables **14**, **15**. In certain embodiments and as discussed below, a rotational aspect of the cable swivel assembly **10** can be provided by the electrical contact assembly **26**.

Exemplary cables **14**, **15** each include one or more terminals/connectors **30** (e.g., female spade connectors **30**) extending from their proximal ends **14**A, **15**A, respectively (FIGS. **3**, **12** and **23**). Distal end **14**B of cable **14** is configured to electrically connect with a power source via plug **17** (e.g., overmolded plug **17**), and distal end **15**B of cable **15** is configured to electrically connect with cleaner unit **12** (e.g., to the motor box of cleaner unit **12**) via connectors **19** (e.g., female pin connectors **19**). In general, connectors **30** are configured to mate with connectors/plugs **41** of the electrical contact assembly **26**, thereby providing an electrical connection between the first and second cables **14** and **15** (via electrical contact assembly **26**). Exemplary electrical contact assembly **26** takes the form of a slip ring assembly **26** or the like (e.g., SRC Pin Connection Slip Ring, SRC 032 Series, Hangzhou Prosper Mechanical & Electrical Technology Co., Ltd., (2011)), although the present disclosure is not limited thereto. Rather, electrical contact assembly **26** can take a variety of forms.

In some embodiments, electrical contact assembly **26** is configured to include at least one rotating portion to allow first and/or second cable **14**, **15** to rotate relative to one another, while maintaining an electrical connection therebetween. In one embodiment, the electrical contact assembly **26** defines a central body **26**A, with a first extension **26**B and a second extension **26**C extending from each side of the central body **26**A (FIGS. **3** and **31**). It is noted that at least one of the first and second extensions **26**B and/or **26**C can rotate relative to central body **26**A.

In an exemplary embodiment, first extension **26**B rotates relative to central body **26**A, and second extension **26**C is static relative to central body **26**A (e.g., second extension **26**C is fixed or stationary relative to central body **26**A). For example, at least some of the components of the second cable **15**, shaft assembly **24** and cleaner cable assembly **22**, along with first extension **26**B, can rotate (e.g., axially rotate) relative to at least some of the other components of cable swivel assembly **10** (e.g., the other components of assembly **10** except second cable **15**, shaft assembly **24**, cleaner cable assembly **22**, and first extension **26**B). As noted, the rotating components are configured to axially rotate while maintaining an electrical connection between the first and second cables **14**, **15**. Thus, a rotational aspect of the cable swivel assembly **10** can be provided by the electrical contact assembly **26**, which thereby prevents the cables **14**, **15** from tangling, and allows continuous current supply and communication to the cleaner unit **12** from the power source.

Stated another way, in some embodiments, a non-rotating group of components (e.g., the other components of assembly **10** except second cable **15**, shaft assembly **24**, cleaner cable assembly **22**, and first extension **26**B) can be attached or secured relative to one another. Moreover, a rotating group of components (e.g., second cable **15**, shaft assembly **24**, cleaner cable assembly **22**, and first extension **26**B) can be attached/secured relative to each other and can rotate relative to the non-rotating group of components. Thus, when the cables **14** and/or **15** rotate or twist during operation of cleaner unit **12** (e.g., during travel of cleaner unit **12**), the rotating components can rotate relative to the non-rotating components to prevent tangling of the cables **14**, **15**. As such, a point of rotation in cable swivel assembly **10** can occur at the electrical contact assembly **26**. Tangling of the first and second cables **14**, **15** is thereby prevented, while an electrical connection between the first and second cables **14**, **15** is maintained (e.g., via the electrical contact assembly **26**).

As noted, exemplary cable swivel assembly **10** includes a swivel body/housing **13**. As shown in FIGS. **2-3** and **16-20**, exemplary swivel housing **13** defines a hollow and substantially cylindrical body/housing **13**, although the present disclosure is not limited thereto. Rather, swivel housing **13** may take a variety of forms, and may be fabricated from a variety of materials. In exemplary embodiments, housing **13** is substantially transparent, and is fabricated from injection molded polycarbonate.

In general, housing **13** is configured to be assembled together with other components of assembly **10** to create a waterproof enclosure for the continuous electrical contact between the first and second cables **14**, **15**. In general and as further discussed below, housing **13** houses at least some of the components that create an electrical connection between the first and second cables **14**, **15**.

In general, housing **13** extends from a first end **32** to a second end **34**. In certain embodiments, housing **13** tapers from the first end **32** (the wider end) to the second end **34** (narrower end—FIG. **18**). In certain embodiments, first end **32** of housing **13** includes a stepped surface **36** that extends inward or toward the center of housing **13** (FIG. **18**). In general, stepped surface **36** extends radially around first end **32**.

In exemplary embodiments and as shown in FIGS. **18** and **20**, the outer surface of the stepped surface **36** includes at least one rib member **38**. Exemplary housing **13** includes two rib members **38**.

In exemplary embodiments, rib members **38** extend away from the outer surface of housing **13**, and extend axially/radially around the stepped surface **36** of the first end **32**. It is noted that housing **13** can include one or more rib members **38** that extend in a variety of directions around and/or on first end **32** (e.g., extend longitudinally, and/or extend radially and longitudinally to create a cross-hatched or honey-combed pattern, etc.). Moreover, it is noted that the one or more rib members **38** can extend continuously or non-continuously around and/or on first end **32**.

As shown in FIG. **18**, the inner surface of the second end **34** of exemplary housing **13** includes a first shelf surface **40** and a second shelf surface **42**. Each exemplary shelf surfaces **40**, **42** each extend inward or toward the center of housing **13**, and radially around the inner surface of second end **34**. It is noted that housing **13** can also include a third shelf surface **43**, or any suitable number of shelf surfaces.

In exemplary embodiments and as discussed further below, first shelf surface **40** is configured and dimensioned to contact and/or engage a first contact surface **44** of seal member **16**, and second shelf surface **42** is configured and dimensioned to

contact and/or engage a second contact surface **46** of seal member **16** (FIGS. **3**, **9** and **18**).

As shown in FIGS. **3** and **8-9**A, exemplary seal member **16** defines a hollow and substantially cylindrical seal member **16**, although the present disclosure is not limited thereto. Rather, seal member **16** may take a variety of forms, and may be fabricated from a variety of materials. In exemplary embodiments, seal member **16** is fabricated from ultra-high molecular weight polyethylene or the like.

In general, seal member **16** is configured to be inserted into and mounted with respect to housing **13** so that the first contact surface **44** of seal member **16** contacts and/or engages the first shelf surface **40** of housing **13**, and the second contact surface **46** of seal member **16** contacts and/or engages the second shelf surface **42** of housing **13** (FIGS. **3**, **9** and **18**).

In exemplary embodiments and as depicted in FIG. **9**, seal member **16** extends from a first end **48** to a second end **50**, and the outer surface of the second end **50** includes a first groove **51**A that extends radially around second end **50**. As shown in FIG. **9**, exemplary first groove **51**A is configured and dimensioned to at least partially house and/or secure a first gasketing material **52**A (e.g., O-ring) or the like. The outer surface of the first end **48** (or second end **50**) can include a second groove **51**B that extends radially around first end **48** (or second end **50**). Exemplary second groove **51**B is configured and dimensioned to at least partially house and/or secure a second gasketing material **52**B (e.g., O-ring).

The second end **50** of exemplary seal member **16** also includes a spring-loaded sealing surface **54** that extends radially around the first contact surface **44** and proximal to the aperture **56** of seal member **16**. As shown in FIGS. **9** and **9**A, exemplary seal member **16** also includes a primary sealing surface **55**, a secondary sealing surface **57** and a bearing surface **59**. In certain embodiments, primary sealing surface **55**, secondary sealing surface **57** and bearing surface **59** extend radially around the inner surface of seal member **16** proximal to aperture **56**. In exemplary embodiments and as discussed further below, primary and secondary sealing surfaces **55**, **57** are configured and dimensioned to provide two sealing/contact or engagement points/surfaces (e.g., interference fit) with a shaft member **58** positioned within aperture **56**, while also allowing the shaft member **58** to rotate relative to seal member **16**. Exemplary bearing surface **59** is configured and dimensioned to provide a substantially non-interference fit or engagement surface with shaft member **58** positioned within aperture **56**, while also allowing the shaft member **58** to rotate relative to seal member **16**, and also substantially preventing shaft member **58** from moving laterally within aperture **56** of seal member **16**.

In general, seal member **16** is configured and dimensioned to be assembled together with other components of assembly **10** to create a waterproof enclosure for the continuous electrical contact between the first and second cables **14**, **15**. For example, once the seal member **16** is inserted into and mounted with respect to housing **13** (FIG. **3**), the first and second gasketing materials **52**A, **52**B provide a fluid-tight seal between the seal member **16** and the housing **13**. Moreover and as further discussed below, after the seal member **16** is mounted with respect to housing **13**, and after the shaft assembly **24** is inserted into housing **13** (FIG. **3**), the spring-loaded sealing surface **54** and the primary and secondary sealing surfaces **55**, **57** of seal member **16** provides a fluid-tight seal between the seal member **16** and a shaft member **58** of shaft assembly **24**, while also allowing the shaft assembly **24** and shaft member **58** (and second cable **15**) to rotate relative to seal member **16** (and relative to housing **13**).

As shown in FIGS. **3**, **39** and **41-42**, exemplary shaft member **58** defines a hollow and substantially cylindrical or tubular shaft member **58**, although the present disclosure is not limited thereto. Rather, shaft member **58** may take a variety of forms, and may be fabricated from a variety of materials. In exemplary embodiments, shaft member **58** is fabricated from stainless steel or the like.

In exemplary embodiments and in order to assemble/fabricate shaft assembly **24**, at least a portion of the proximal end **15**A of second cable **15** is positioned within the shaft member **58**. As discussed further below and as shown in FIG. **24**, it is noted that the exemplary portion of the second cable **15** that is positioned within shaft member **58** includes insulated wire conductors **62** (e.g., #16AWG 65/34 bare copper) inside an extruded core **64** (e.g., PVC core jacket), portions of which may be covered by a heat shrink material/tubing **66** (e.g., PVC heat shrink tubing). It is noted that exemplary heat shrink material/tubing **66** provides torsional rigidity to second cable **15**. As shown in FIG. **24**, exemplary cable **15** can also include strength members **67** (e.g., strands of aramid fiber).

After a portion of the proximal end **15**A of second cable **15** is positioned within the shaft member **58**, the shaft assembly **24** is then assembled/fabricated by fabricating (e.g., overmolding) an outer member **60** around and over at least a portion of the shaft member **58** and around and over at least a portion of the proximal end **15**A of second cable **15** (FIG. **42**). In exemplary embodiments, after outer member **60** has been fabricated/overmolded around and over at least a portion of the shaft member **58** and at least a portion of the proximal end **15**A of second cable **15**, the outer member **60**, cleaner cable assembly **22**, second cable **15** and shaft member **58** are fixedly secured or mounted with respect to one another. Thus, when second cable **15** is turned/rotated by cleaner unit **12**, the outer member **60**, cleaner cable assembly **22**, second cable **15** and shaft member **58** can rotate as a unit (e.g., via rotating extension **26**B of electrical contact assembly **26**) relative to the other components of assembly **10** (e.g., relative to housing **13**, seal member **16**, first cable **14**, central body **26**A and extension **26**C of electrical contact assembly **26**, etc.).

Moreover and as discussed further below, after outer member **60** has been fabricated/overmolded around and over at least a portion of the shaft member **58** and at least a portion of the proximal end **15**A of second cable **15**, it is noted that the terminals/connectors **30** of second cable **15** extend from a surface of outer member **60** (FIG. **42**).

As shown in FIGS. **3** and **39-43**, exemplary outer member **60** defines a partially hollow and substantially cylindrical or tubular outer member **60**, although the present disclosure is not limited thereto. Rather, outer member **60** may take a variety of forms, and may be fabricated from a variety of materials. In exemplary embodiments, outer member **60** is fabricated or overmolded from a plastic or polymeric material or the like.

As shown in FIGS. **39-43**, outer member **60** extends from a first end **68** to a second end **70**. In exemplary embodiments, first end **68** includes a hollow portion **72**, with hollow portion **72** configured and dimensioned to house the connectors **30** of second cable **15**. As shown in FIG. **42**, connectors **30** extend from a lower surface of hollow portion **72**. As depicted in FIGS. **3** and **42**, at least a portion of the outer wall **71** (e.g., radial wall **71**) of hollow portion **72** is configured to mate and/or engage with the outer wall/section of rotating extension **26**B of electrical contact assembly **26**.

The second end **70** of exemplary outer member **60** includes a washer section **74** that protrudes radially around the second end **70**. As shown in FIGS. **3**, **9** and **42**, the lower surface **75** of washer section **74** is configured and dimensioned to abut

against the upper surface **53** of seal member **16** when the shaft assembly **24** is inserted into housing **13** containing mounted seal member **16**. As such, lower surface **75** of washer section **70** is configured to rotate relative to upper surface **53** of seal member **16**, after assembly **10** is fabricated/assembled and when second cable **15** is turned/rotated.

As noted above and as shown in FIGS. **21-24**, cleaner cable assembly **22** associated with shaft assembly **24** includes second cable **15**, connectors **19** (e.g., female pin connectors **19**) and terminals/connectors **30** (e.g., female spade connectors **30**).

In exemplary embodiments and as shown in FIGS. **2**, **5**, **21** and **23**, cleaner cable assembly **22** also includes one or more suppression members **21** (e.g., ferrite electromagnetic interference ("EMI") suppression members or cable cores). Cleaner cable assembly **22** can also include at least one grommet member **23**. In certain embodiments and as shown in FIG. **21**, a secondary heat shrink material/tubing **25** (e.g., flexible polyolefin material) can cover each suppression member **21** and/or cover at least a portion of extruded core **64** and/or heat shrink material/tubing **66** of second cable **15**.

With reference now to power cable assembly **20** and as depicted in FIGS. **2**, **5** and **10-15**, power cable assembly **20** includes first cable **14**, plug **17**, and terminals/connectors **30** (e.g., female spade connectors **30**).

As shown in FIGS. **2**, **5** and **10-15**, it is noted that a proximal portion of exemplary first cable **14** includes insulated wire conductors **162** (e.g., #16AWG 65/34 bare copper) inside an extruded core **164** (e.g., PVC core jacket), portions of which may be covered by a heat shrink material/tubing **166** (e.g., PVC heat shrink tubing). It is noted that exemplary heat shrink material/tubing **166** provides torsional rigidity to first cable **14**. As shown in FIGS. **13-14**, exemplary first cable **14** can also include strength members **167** (e.g., strands of aramid fiber).

Power cable assembly **20** also includes one or more suppression members **121** (e.g., ferrite EMI suppression members or cable cores). In certain embodiments and as shown in FIGS. **10-15**, a secondary heat shrink material/tubing **125** (e.g., flexible polyolefin material) can cover each suppression member **121** and/or cover at least a portion of extruded core **164** and/or heat shrink material/tubing **166** of first cable **14**.

In exemplary embodiments and as shown in FIGS. **12** and **14**, at least a portion of first cable **14** extending from suppression member **121** and towards the distal end **14**B includes insulated wire conductors **162** inside the extruded core **164**, portions of which may be covered by a jacket material **76** (e.g., a floating or buoyant foam material **76** or the like). As shown in FIGS. **12**, **14** and **15**, portions of jacket material **76** can be covered by secondary heat shrink material/tubing **125**.

Prior to final assembly/fabrication of electric cable swivel assembly **10**, a support member **28** is mounted, fabricated or overmolded with respect to at least a portion of power cable assembly **20** (FIGS. **3** and **31**).

In exemplary embodiments, the support member **28** and mounted power cable assembly **20** is assembled/fabricated by fabricating (e.g., overmolding) the support member **28** around and over at least a portion of the proximal end **14**A of first cable **14**. In certain embodiments, after support member **28** has been fabricated/overmolded around and over at least a portion of the proximal end **14**A of first cable **14**, the support member **28**, power cable assembly **20**, and first cable **14** are fixedly secured or mounted with respect to one another.

As discussed further below, after support member **28** has been fabricated/overmolded around and over at least a portion of the proximal end **14**A of first cable **14**, it is noted that the terminals/connectors **30** of first cable **14** extend from a surface of support member **28** (FIG. **31**).

As shown in FIGS. **31-38**, exemplary support member **28** defines a partially hollow and partially cylindrical support member **28**, although the present disclosure is not limited thereto. Rather, support member **28** may take a variety of forms, and may be fabricated from a variety of materials. In exemplary embodiments, support member **28** is fabricated or overmolded from a plastic or polymeric material or the like.

As shown in FIGS. **31-38**, support member **28** extends from a first end **27** to a second end **29**. In exemplary embodiments, second end **29** includes a hollow portion **31**, with hollow portion **31** configured and dimensioned to house the connectors **30** of first cable **14**. In certain embodiments, connectors **30** extend from a lower surface of hollow portion **31** (FIG. **31**). As depicted in FIGS. **3** and **31**, at least a portion of the outer wall **33** (e.g., radial wall **33**) of hollow portion **31** is configured to mate and/or engage with the outer wall/section of extension **26**C of electrical contact assembly **26**.

In exemplary embodiments and as shown in FIGS. **31** and **36**, the outer wall **33** of the second end **29** includes a groove **35** that extends radially around second end **29**. As shown in FIGS. **3** and **31**, exemplary groove **35** is configured and dimensioned to at least partially house and/or secure a gasketing material **37** (e.g., O-ring) or the like. The second end **29** of exemplary support member **28** also includes an abutment surface **39** that extends radially around the second end **29** and is configured and dimensioned to abut against the first end **32** of housing **13** (FIGS. **3** and **31**).

In general, support member **28** is configured and dimensioned to be assembled together with other components of assembly **10** to create a waterproof enclosure for the continuous electrical contact between the first and second cables **14**, **15**. For example, once the second end **29** of support member **28** is inserted into and mounted with respect to housing **13** (FIGS. **3** and **31**), the gasketing material **37** provides a fluid-tight seal between the support member **28** and the housing **13**.

During assembly of electric cable swivel assembly **10**, first the seal member **16** can be inserted into and mounted with respect to housing **13**. For example, seal member **16** can be inserted into and mounted with respect to housing **13** so that the first contact surface **44** of seal member **16** contacts and/or engages the first shelf surface **40** of housing **13**, and the second contact surface **46** of seal member **16** contacts and/or engages the second shelf surface **42** of housing **13** (FIGS. **3**, **9** and **18**). As noted, once the seal member **16** is inserted into and mounted with respect to housing **13** (FIG. **3**), the first and second gasketing materials **52**A, **52**B provide a fluid-tight seal between the seal member **16** and the housing **13**.

Next, the shaft assembly **24** and associated second cable **15** is inserted into housing **13** containing the mounted seal member **16**, until the lower surface **75** of washer section **74** of the outer member **60** of the shaft assembly **24** abuts against the upper surface **53** of seal member **16**. As noted, lower surface **75** of washer section **70** is configured to rotate relative to upper surface **53** of seal member **16**, after assembly **10** is fabricated/assembled and when second cable **15** is turned/rotated. Moreover, after the seal member **16** is mounted with respect to housing **13**, and after the shaft assembly **24** is inserted into housing **13** (FIG. **3**), the spring-loaded sealing surface **54** of seal member **16** provides a fluid-tight seal between the seal member **16** and the shaft member **58** of shaft assembly **24**, while also allowing the shaft assembly **24** and shaft member **58** (and second cable **15**) to rotate relative to seal member **16** (and relative to housing **13**).

Next, the first end **68** of outer member **60** of shaft assembly **24** is mated/engaged with the rotating extension **26**B of elec-

trical contact assembly **26**. As noted, at least a portion of the outer wall **71** of hollow portion **72** of outer member **60** is configured to mate and/or engage with the outer wall/section of rotating extension **26**B of electrical contact assembly **26**. Moreover, connectors **30** of cable assembly **22** are configured to mate with connectors/plugs **41** of rotating extension **26**B of electrical contact assembly **26**.

Next, the support member **28** and associated first cable **14** is inserted at least partially into housing **13** until the abutment surface **39** of the support member **28** abuts against the first end **32** of housing **13** (FIGS. **3** and **31**). As noted, once the second end **29** of support member **28** is inserted into and mounted with respect to housing **13** (FIGS. **3** and **31**), the gasketing material **37** can provide a fluid-tight seal between the support member **28** and the housing **13**. Moreover, at least a portion of the outer wall **33** of hollow portion **31** of support member **28** is configured to mate and/or engage with the outer wall/section of extension **26**C of electrical contact assembly **26**, and connectors **30** of cable assembly **20** are configured to mate with connectors/plugs **41** of extension **26**C of electrical contact assembly **26** to thereby provide an electrical connection between the first and second cables **14** and **15** (via electrical contact assembly **26**).

Next, this sub-assembly is positioned in a tool (e.g., overmolding tool) that is configured and adapted to apply the overmold member **18** to electric cable swivel assembly **10** (FIGS. **2**, **3**, **5-7** and **25-31**). In exemplary embodiments, during the overmolding process, the tool (e.g., overmolding tool) includes one or more protruding members or bosses that press against, stabilize and/or substantially immobilize the support member **28** during fabrication of the overmold member **18** on assembly **10**. As shown in FIGS. **3**, **25-28**, **30** and **31**, the one or more bosses/protruding members of the tool thereby provide or fabricate one or more recesses **82** of overmold member **18** after fabrication of overmold member **18**.

In exemplary embodiments and as depicted in FIGS. **2**, **3**, **5-7** and **25-31**, the overmold member **18** is a flexible plastic member/material that is applied to assembly **10** during the final stages of fabrication. In certain embodiments, the overmold member **18** bonds (e.g., chemically bonds) to the support member **28**, to the housing **13** and/or to power cable assembly **20** to hermetically secure the assembly **10** as a singular working unit or assembly **10**. In exemplary embodiments, it is noted that the one or more rib members **38** of housing **13** provide mating/engagement surfaces with overmold member **18**, and/or the abutment surface **39** of support member **28** provides a mating/engagement surface with overmold member **18**.

In general, overmold member **18** extends from a first end **78** to a second end **80**. In certain embodiments, overmold member **18** tapers from the first end **78** (the wider end) to the second end **80** (narrower end—FIG. **28**). As shown in FIGS. **25-30**, exemplary overmold member **18** defines a hollow and substantially cylindrical overmold member **18**, although the present disclosure is not limited thereto. Rather, overmold member **18** may take a variety of forms, and may be fabricated from a variety of materials. In exemplary embodiments, overmold member **18** is fabricated or overmolded from a plastic or polymeric material or the like.

As noted above, after electric cable swivel assembly **10** is fabricated and assembled together, assembly **10** thereafter allows at least some of the components of the second cable **15**, shaft assembly **24** and cleaner cable assembly **22**, along with first extension **26**B, to rotate (e.g., axially rotate) relative to at least some of the other components of cable swivel assembly **10** (e.g., the other components of assembly **10** except second cable **15**, shaft assembly **24**, cleaner cable assembly **22**, and first extension **26**B). The exemplary rotating components are configured to axially rotate while maintaining an electrical connection between the first and second cables **14**, **15**, and this rotational aspect of the cable swivel assembly **10** thereby advantageously prevents the cables **14**, **15** from tangling, and allows continuous current supply and communication to the cleaner unit **12** from the power source. In other words, when the cables **14** and/or **15** rotate or twist during operation of cleaner unit **12** (e.g., during travel of cleaner unit **12**), the rotating components can rotate relative to the non-rotating components to advantageously prevent tangling of the cables **14**, **15**. In short, tangling of the first and second cables **14**, **15** is thereby prevented by the improved electric cable swivel assembly **10**, while an electrical connection between the first and second cables **14**, **15** is maintained.

Whereas the disclosure has been described principally in connection with electric cable swivel assemblies for use in for use in cleaning surfaces of a swimming pool or the like, such description has been utilized only for purposes of disclosure and is not intended as limiting the disclosure. To the contrary, it is to be recognized that the disclosed electric cable swivel assemblies are capable of use with other cleaner units or the like for other cleaning purposes (e.g., for use in cleaning surfaces of a spa, tub, tank, fluid system, etc.).

Although the systems and methods of the present disclosure have been described with reference to exemplary embodiments thereof, the present disclosure is not limited to such exemplary embodiments and/or implementations. Rather, the systems and methods of the present disclosure are susceptible to many implementations and applications, as will be readily apparent to persons skilled in the art from the disclosure hereof. The present disclosure expressly encompasses such modifications, enhancements and/or variations of the disclosed embodiments. Since many changes could be made in the above construction and many widely different embodiments of this disclosure could be made without departing from the scope thereof, it is intended that all matter contained in the drawings and specification shall be interpreted as illustrative and not in a limiting sense. Additional modifications, changes, and substitutions are intended in the foregoing disclosure. Accordingly, it is appropriate that the appended claims be construed broadly and in a manner consistent with the scope of the disclosure.

What is claimed is:

1. An electric cable swivel assembly comprising:

a housing that extends from a first end to a second end;

a seal member configured to mount with respect to the second end of the housing, the seal member extending from a first end to a second end and having an aperture that extends from the first end to the second end;

a shaft assembly having an outer member extending from a first end to a second end and having the second end of the outer member mounted with respect to a shaft member and to a first cable assembly associated with a first cable, the shaft member configured to be at least partially housed within the aperture of the seal member and rotatable relative to the seal member and to the housing when the seal member is mounted with respect to the housing;

an electrical contact assembly extending from a first end to a second end, the second end of the electrical contact assembly mounted with respect to the first end of the outer member;

a support member extending from a first end to a second end and having: (i) the first end of the support member mounted with respect to a second cable assembly asso-

ciated with a second cable, and (ii) the second end mounted with respect to the first end of the electrical contact assembly; and

an overmold member positioned over at least a portion of the housing and the support member, the overmold member configured to hermetically secure the housing and the support member;

wherein the electrical contact assembly connects the first cable and the second cable and provides a continuous electrical contact between the first cable and the second cable while the first cable rotates axially relative to the second cable.

2. The electric cable swivel assembly of claim **1**, wherein the first cable extends from a first end to a second end, the first end of the first cable mounted with respect to the outer member and the second end of the first cable mounted with respect to a pool cleaner unit; and

wherein the second cable extends from a first end to a second end, the first end of the second cable mounted with respect to the support member and the second end of the second cable mounted with respect to a power source.

3. The electric cable swivel assembly of claim **1**, wherein the first end of the housing includes at least one rib member that extends from the first end of the housing, the at least one rib member configured to engage the overmold member to facilitate the hermetic securement of the housing.

4. The electric cable swivel assembly of claim **1**, wherein the second end of the housing includes a first shelf surface and a second shelf surface;

wherein the seal member includes a first contact surface and a second contact surface; and

wherein when the seal member is mounted with respect to the housing, the first shelf surface of the housing engages the first contact surface of the seal member, and the second shelf surface of the housing engages the second contact surface of the seal member.

5. The electric cable swivel assembly of claim **1**, wherein an outer surface of the seal member includes a first groove that houses a first gasketing material, and a second groove that houses a second gasketing material; and

wherein when the seal member is mounted with respect to the housing, the first and second gasketing materials form a fluid-tight seal between the seal member and the housing.

6. The electric cable swivel assembly of claim **1**, wherein the seal member includes a spring-loaded sealing surface that extends around and proximal to the aperture of the seal member; and

wherein when the shaft member is housed within the aperture of the seal member, the spring-loaded sealing surface of the seal member provides a fluid-tight seal between the seal member and the shaft member while allowing the shaft member to rotate relative to the seal member.

7. The electric cable swivel assembly of claim **1**, wherein the shaft member is substantially tubular;

wherein a portion of the first cable is positioned within the shaft member; and

wherein the outer member of the shaft assembly is an internal overmold member that is positioned around at least a portion of the shaft member and the first cable to secure the outer member, shaft member and first cable relative to one another.

8. The electric cable swivel assembly of claim **1**, wherein the second end of the outer member includes a protruding section that abuts an abutment surface of the seal member when the shaft member is housed within the aperture of the seal member.

9. The electric cable swivel assembly of claim **1**, wherein the first and second cable assemblies include at least one electromagnetic interference suppression member.

10. The electric cable swivel assembly of claim **1**, wherein the support member is an internal overmold member that is positioned around at least a portion of the second cable to secure the support member and the second cable relative to one another.

11. The electric cable swivel assembly of claim **1**, wherein an outer surface of the second end of the support member includes a groove that houses a gasketing material;

wherein the second end of the support member includes an abutment surface;

wherein when the housing and the support member are hermetically secured, the abutment surface abuts against the first end of the housing, and the gasketing material provides a seal between the support member and the housing.

12. A method for fabricating an electric cable swivel assembly for a swimming pool cleaner power cable comprising:

providing a housing that extends from a first end to a second end;

providing a seal member, the seal member extending from a first end to a second end and having an aperture that extends from the first end to the second end;

mounting the seal member with respect to the second end of the housing;

providing a shaft assembly having an outer member extending from a first end to a second end;

mounting the second end of the outer member with respect to a shaft member and to a first cable assembly associated with a first cable;

housing at least a portion of the shaft member within the aperture of the seal member so that the shaft member is rotatable relative to the seal member and to the housing after the seal member is mounted with respect to the housing;

providing an electrical contact assembly extending from a first end to a second end;

mounting the second end of e electrical contact assembly with respect to the first end of the outer member;

providing a support member extending from a first end to a second end;

mounting the first end of the support member with respect to a second cable assembly associated with a second cable;

mounting the second end of the support member with respect to the first end of the electrical contact assembly; and

overmolding an overmold member over at least a portion of the housing and the support member to hermetically secure the housing and the support member;

wherein the electrical contact assembly connects the first cable and the second cable and provides a continuous electrical contact between the first cable and the second cable while the first cable rotates axially relative to the second cable.

13. The method of claim **12**, wherein the first cable extends from a first end to a second end, the first end of the first cable mounted with respect to the outer member and the second end of the first cable mounted with respect to a pool cleaner unit; and

wherein the second cable extends from a first end to a second end, the first end of the second cable mounted with respect to the support member and the second end of the second cable mounted with respect to a power source.

14. The method of claim **12**, wherein the first end of the housing includes at least one rib member that extends from the first end of the housing, the at least one rib member configured to engage the over old member to facilitate the hermetic securement of the housing.

15. The method of claim **12**, wherein the second end of the housing includes a first shelf surface and a second shelf surface;

wherein the seal member includes a first contact surface and a second contact surface; and

wherein when the seal member is mounted with respect to the housing, the first shelf surface of the housing engages the first contact surface of the seal member, and the second shelf surface of the housing engages the second contact surface of the seal member.

16. The method of claim **12**, wherein an outer surface of the seal member includes a first groove that houses a first gasketing material, and a second groove that houses a second gasketingmaterial; and

wherein when the seal member is mounted with respect to the housing, the first and second gasketing materials form a fluid-tight seal between the seal member and the housing.

17. The method of claim **12**, wherein the seal member includes a spring-loaded sealing surface that extends around and proximal to the aperture of the seal member; and

wherein when the shaft member is housed within the aperture of the seal member, the spring-loaded sealing surface of the seal member provides a fluid-tight seal between the seal member and the shaft member while allowing the shaft member to rotate relative to the seal member.

18. The method of claim **12**, wherein the shaft member is substantially tubular;

wherein a portion of the first cable is positioned within the shaft member; and

wherein the outer member is an overmold member that is positioned around at least a portion of the shaft member and the first cable to secure the overmold member, shaft member and first cable relative to one another.

19. The method of claim **12**, wherein the second end of the outer member includes a protruding section that abuts an abutment surface of the seal member when the shaft member is housed within the aperture of the seal member.

20. The method of claim **12**, wherein the first and second cable assemblies include at least one electromagnetic interference suppression member.

21. The method of claim **12**, wherein the support member is an internal overmold member that is positioned around at least a portion of the second cable to secure the support member and the second cable relative to one another.

22. The method of claim **12**, wherein an outer surface of the second end of the support member includes a groove that houses a gasketing material;

wherein the second end of the support member includes an abutment surface;

wherein when the housing and the support member are hermetically secured, the abutment surface abuts against the first end of the housing, and the gasketing material provides a seal between the support member and the housing.

23. An electric cable swivel assembly fabricated according to the steps comprising:

providing a housing that extends from a first end to a second end;

providing a seal member, the seal member extending from a first end to a second end and having an aperture that extends from the first end to the second end;

mounting the seal member with respect to the second end of the housing;

providing a shaft assembly having an outer member extending from a first end to a second end;

mounting the second end of the outer member with respect to a shaft member and to a first cable assembly associated with a first cable;

housing at least a portion of the shaft member within the aperture of the seal member so that the shaft member is rotatable relative to the seal member and to the housing after the seal member is mounted with respect to the housing;

providing an electrical contact assembly extending from a first end to a second end;

mounting the second end of the electrical contact assembly with respect to the first end of the outer member;

providing a support member extending from a first end to a second end;

mounting the first end of the support member with respect to a second cable assembly associated with a second cable;

mounting the second end of the support member with respect to the first end of the electrical contact assembly; and

overmolding an overmold member over at least a portion of the housing and the support member to hermetically secure the housing and the support member;

wherein the electrical contact assembly connects the first cable and the second cable and provides a continuous electrical contact between the first cable and the second cable while the first cable rotates axially relative to the second cable.

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